THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. DECEMBER 28, 1893. CHICAGO, ILL. NUMBER 52.

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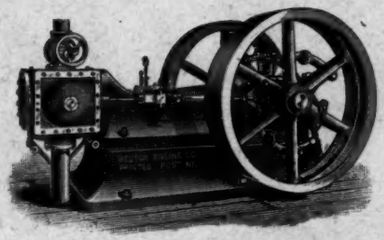

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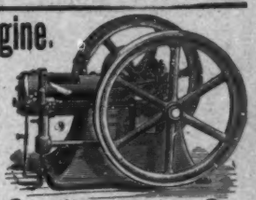

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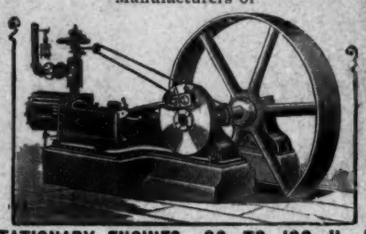

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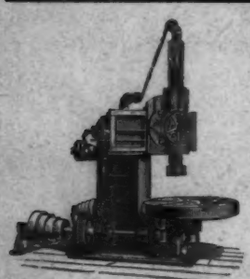

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THE IRON TRADE REVIEW

VOLUME XXVI. CLEVELAND, O. DECEMBER 28, 1893. CHICAGO, ILL. NUMBER 52.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

With the time for balancing the year's business only a few days off, nothing is to be looked for in the iron trade but more pronounced quietness. Surmises as to what may be expected after the opening of the new year take the place of the usual staple of market gossip. There is an agreement in the general statement that an expansion into anything like the old-time demand need not be looked for in 60 or 90 days, or in twice that time; but that a larger call for iron and steel products than has been known at any time in the past six months may reasonably be expected early in the year, and that this will tend to increase. That producing capacity, in the whole range of material, will continue for some time to be much more than adequate to consumptive demand, is evident, since most new enterprises will wait upon the new tariff act. Yet the accumulation of renewal demands in these months of stagnation ought to insure a continuance of the better symptoms noted in December; but the market will creep before it walks. Coming to actual conditions to-day, pig iron was never lower than in this closing week, and all reports as to the firm attitude of furnaces sold ahead are overtopped by the willingness of other producers to take six months contracts at figures very close to those named in connection with immediate deliveries. Bessemer pig at Pittsburg has been sold below $11 for deliveries running to July 1 of next year, and a round sale by a large producer is reported at a figure considerably below the $10.75 of a week ago. Billets are still at the $16.50 mark, but transactions are limited. Pittsburg more than ever holds the key to the situation in iron and steel. Her mills have been invading every market, and it has been openly given out that work is to be taken regardless of profit, or even of costs, that mills may be filled and kept going. In the case of the largest producer, many contracts taken in the past two months will be executed under a schedule of wages much lower than heretofore paid. This may ensure some slight profit, even on the prodigious cut prices of which the trade has been hearing of late; it also makes it practically certain that the lowest notch has been reached on plates, angles, beams and channels, and this view of the situation may lead buyers to considerable contracting early in the year. The coke situation is also an element in the account. A strike in February, by employes of Connellsville companies now paying on the $1.75 basis, would bear hard upon steel manufacturers whose furnaces did not happen to have the heavy accumulations of coke visible in the yards of some large producers. Certain contingencies, bearing upon the price of Bessemer pig iron, and upon the ability of steel works to fill orders in case of a strike, are just now making the question of coke contracts for the first half of 1894 of peculiar interest. Lack of orders ahead is the general complaint among rolling mills and steel works, yet within the past fortnight, particularly in the Central West, inquiries have increased to an extent that justifies expectations of moderate buying in the near future. Agricultural works are doing more than at any time since the panic; there is fully as much demand on bridge account as comes at this season of the year, and building material is more active than in the early part of December. Among buyers of pig iron, cast iron pipe works and stove works are busiest just now; jobbing and machinery founders are dull, with few exceptions. The financial condition of the general iron trade is unchanged. The few failures recently noted were not unexpected, but everywhere the strain is still severe. Two important railroad receiverships within a week add no encouragement to the outlook from that standpoint and make the steel rail demand still more problematic.

THE CLEVELAND OUTLOOK.

A rumor has floated through Pittsburg market circles, the past week, that a large sale of Mesabi ore had been made. The figure named was much too low for Bessemer ore, and the fact that no large Mesabi sale has been made recently makes it probable that the deal of the Thomas Iron Co. for the Hale output of the next few years has been threshed over again in market gossip. The question of freight rates from mines to upper lake ports has been under consideration among ore producers and the railroads, of late, and the probability of a 65-cent rail rate for Mesabi ore makes it likely that freights on old-range lines will stand corresponding reductions. Nothing definite can be said as yet, however, as to the figures that will be made. At present the Marquette range is the scene of greatest mining activity, and the ore raised is mined on a very low wage basis; yet the limited scale of operations makes the cost per ton greater than present conditions warrant, with so small a tonnage, comparatively, by which to divide fixed charges.

Pig Iron. While foundry yards are bare, there is a prospect of moderate buying by melters of pig iron after the year's business has been closed up. Bessemer has shown a few transactions in the valleys, of late, at $10.25 and $10.35 at furnace, but the pig iron market in general is a waiting one.

Finished Material. A contract involving several hundred tons of bar iron was taken in the local market the past week; that an extremely low price was made goes without saying. Valley iron mills find the market flatter and more unprofitable than at any time since the resumptions there. It has now come to be simply a question how much below 1.30c at mill a seller is willing to go, where considerable tonnage is involved. In steel a better inquiry is noted. An agricultural contract for several hundred tons, largely boiler, flange and tire steel, is to be closed with the week, and the general outlook for plates and angles is improved.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Except for a little increase in the sales of pig iron, the week shows no improvement over the week previous. It is expected, however, that with the first of the year business will show quite a decided improvement in a good many branches, and as inquiries have been received for considerable lots to be bid upon very shortly, it is quite likely that this expectation will be realized.

PIG IRON.—Sales of coke iron have been considerably larger in the past week than they were the week before, and orders have increased somewhat in size. Shipments have been made a little more freely, also, and as there are several inquiries in the market for lots running up as high as 1,000 to 1,500 tons, it is expected that January will show a decided improvement in the number and amounts of sales. Several small sales of Lake Superior charcoal have been made, but the orders have been taken principally by the holders of bankrupt stocks, at prices which defy competition from dealers. Prices on Southern iron show a little weakness, and some of the furnaces have receded a little from the decided stand they took in the past few weeks.

BARS.—Specifications have been received for shipments a little more freely than was the case last week, but no sales of any consequence have been made. Quotations are made at 1.35c to 1.40c on iron, and 1.50c to 1.55c on steel bars, f. o. b. Chicago.

STRUCTURAL MATERIAL.—The week has been very quiet, and no new deals have been announced. Sales have been very small, and quotations are unchanged. Beams, 1.70c to 1.75c; angles, 1.65c to 1.70c; plates, 1.65c to 1.70c; tees, 1.90c to 2c.

RAILS AND TRACK SUPPLIES.—The market is very dull, and it is hardly likely that any improvement will be noticed before the first of the year. Quotations are as follows: Rails $25; spikes, 1.90c to 1.95c; splice bars, 1.50c to 1.55c.

BILLETS.—The market is quiet, and quotations are unchanged at $19.25 to $19.50, Joliet.

SHEETS.—Black sheets are very quiet, with quotations unchanged at 2.70c to 2.75c, Chicago. Galvanized sheets are having a fairly good demand, with quotations at 75 per cent. discount for mill shipments.

PLATES, TUBES, ETC.—No mill orders of any size have been received, and general business is reported very quiet. Quotations are unchanged. Tank steel, 1.65c to 1.75c; shell steel, 1.85c to 1.90c; flange steel, 2 05c to 2.15c; firebox steel, 3 75c to 5c; tubes, 70 and 5 per cent off.

MERCHANT STEEL.—No sales of any size have been made, and it is likely that no great improvement will be noticed before the next three or four weeks. Quotations are as last reported. Open-hearth spring, 1.95c to 2.10c; machinery, 2c to 2.10c; tire, 1.95c to 2.10c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

OLD RAILS AND WHEELS.—Old wheels are quiet, and are still quoted at $9.50 to $10. Old rails are having very little demand, and are quoted nominally at $13. In old steel rails no business has been done. Quotations are made at $7 to $7.50 for short lengths, and $10 for long lengths.

SCRAP.—The market has been very quiet, with only a few small sales. Prices are as last reported. No. 1 forge, $10 to $11; No. 1 mill, $8; axles, $13; cast borings, $3.50; wrought turnings, $4.50; axle turnings, $6; mixed steel, $6.50; low tires, $10; leaf steel, $10.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The pig iron market, that has been weak for the past half year, has shown a tendency in the past four or five weeks to fall off still further, and the low prices on ore and coke, which some of the recently started furnaces in the Pittsburg district and the valleys have commanded, give no promise of any recovery. Gray forge at $10 Pittsburg means $9 35 at valley furnace, a depth never before touched; and when it is considered that foundry irons offer no profit, and that gray forge represents an identical cost in making, the loss on mill irons at the figure named will be appreciated. Bessemer pig at a figure shading $11, and billets at $16.50, indicate the extreme weakness in the steel market, only relieved by a hope of better demand after the opening of the year. In manufactured iron and steel prices are still being savagely cut, and buyers themselves are surprised at the quotations they are able to get. The contract on the steel for the Westinghouse buildings shows what extraordinary figures may be secured by capital that is available for such operations. Wage cuts that begin with the new year are apt to encourage sellers in dropping prices beyond any precedent on orders involving large tonnage. The January furnace report will show an increased output, and when January contracts are made it will be found that the wait has been no detriment to buyers.

Cincinnati. The week has been one of the quietest of the year in all branches of the iron trade. It is assumed as a matter of course that very little will be done in the way of new engagements until after Jan. 1, and therefore little effort is being put forth. There is a slow increase of production both South and North, but so far as can be seen, it no more than keeps pace with the increasing consumption. As a matter of fact, stocks have been materially reduced some time past. Southern furnaces are shipping heavily on old orders, and most of them continue to reduce stocks. The industries that are now most active are cast iron pipe works, agricultural implements works and stove works. Rolling mills are doing more than they were in the fall, but all complain of lack of orders ahead. Jobbing and machinery foundries are very dull everywhere. There is plenty of money at cheap rates for those of high credit, but concerns of secondary standing find it more difficult to get accommodations.

Louisville. Business is very quiet during the holidays, and very little will be done before the first of the year. There has been no change in prices; few inquiries for iron, owing to the lateness of the year, and little business can be expected until the middle of January. A sale of 1,000 tons of No. 2 foundry was made in the week, below basis of $8, but it was not made by furnace interests. There is no question that if Southern companies desire to sell, at present prices, to parties wanting to buy for investment, large blocks of iron could be so placed, so that there is no occasion for them to make less than the ruling quotations to consumers. There is no life in car wheel irons. Old car wheels are quite unsalable, save at less than $10 per ton.

Buffalo. The holiday dullness has thoroughly settled down upon the pig iron business, and the stagnation is intensified by proceedings at Washington. There is very little iron selling, and as it is not the period for contracting to cover future wants, the sales are all for early consumption. Prices are firm, however, chiefly because there is no margin for reductions. Sellers prefer to keep their iron rather than to sell at anything less than the prevailing figures.

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

PUBLISHED EVERY THURSDAY BY

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DECEMBER 28, 1893.

FOUNDRYMAN AND FURNACEMAN.

The paper presented to the Western Foundrymen's Association by Mr. E. A. Wheeler, the well known blast furnace manager, of Sharon, Pa., dealt with a question in which furnace and foundry companies have a common interest. The discussion it evoked showed that the foundrymen present had been touched upon a point of vital importance in their work; and if the letter-books of sellers of foundry iron could be put before our readers they would give abundant proof that the disturbing element in the relations of furnacemen and foundrymen is the lack of definite information as to the chemical composition of pig iron and of a standard of grading recognized alike by maker and buyer. We believe that the two foundrymen's associations, east and west, will have more than justified their establishment, if through them can be brought about a better understanding between the smelter of ores and the melter of pig iron. And there is no more direct road to such an understanding than to bring together in familiar discussion the furnace manager, the furnace chemist and the practical foundryman. We commend the paper of Mr. Wheeler and the discussion upon it to the careful reading of our entire blast furnace and foundry constituency.

There is still much difference of opinion as to the present method of grading pig iron. The belief has been gaining ground that the fracture is a very unreliable index of the quality of the iron, and that purchases should be made upon chemical analysis rather than upon grades established by the judgment of the eye. Yet the variations of pigs belonging to the same cast suggest that chemical analysis would not entirely meet the case unless samplings were frequent; and even then the eye must supplement the work of the chemist in assorting the various portions of the same cast. A recent writer on this subject presents a table showing variations in the amount of silicon in the three grades, No. 1X, No. 2X and No. 3, taken from one cast. Twenty-one casts are reported on. The silicon contents of the No. 1X ranged from 3.71 per cent. down to 1.25 per cent.; of the No. 2X, from 3.57 down to 1.03, and of the No. 3, from 3.29 down to 0.89. In every case the No. 2X had less silicon than the No. 1X, and the No. 3 less than the No. 2X, although in each case the three grades were produced in the same cast. The conclusion is deduced by this writer that the variation in silicon contents of the same cast is the cause of the difference in grade. "It is well known," he adds, "that silicon has the property of causing combined carbon in pig iron to crystallize out as graphite when the fluid iron solidifies; and since it is by the amount of coarsely crystalline graphite visible to the eye that the iron is graded, it follows that the grade is determined by the relative amount of silicon present. Whatever theory may be accepted, the fact remains that the most openly crystallized iron in each cast contains the most silicon, and the difference is often very great. We are, therefore, constrained to believe that the method of grading pig iron in vogue is not so arbitrary as is supposed, but that it really rests on a scientific basis."

There are those who take the position that silicon has been given undue prominence in the discussions as to foundry irons, but the authority whom we have quoted above is quite in accord with Mr. Wheeler's paper, as well as with the conclusions of Mr. W. J. Keep, of Detroit, whose experiments in this direction are so well known, in making silicon almost the sole element of the foundryman's concern. Mr. Keep, it will be remembered, contributed a paper to the Engineering Congress at Chicago, last summer, in which he took the ground that sulphur should cut a very small figure in the foundryman's calculations, demonstrating by the results of his experiments that it was far from being the culprit it has been supposed to be, and contending that it was difficult, if not impossible, to introduce sulphur into gray cast iron.

It may yet be discovered—and we trust discussion and experiment will go on, to that end—that the difficulties of foundry practice arising from varying constituents of iron involve far less complexity than melters of iron have been wont to suppose.

SUPERIORITY OF AMERICAN MACHINERY.

There are one or two tariff points in the subjoined clipping that are worth pondering upon. One is the market which American locomotives and other machinery have secured abroad, in competition with foreign countries, on the score of superiority; another is the recognition by our English contemporary, the London *Iron and Coal Trades Journal*, from which we quote, of the fact that American manufacturers will be brought much nearer even than they are to-day to the cheap labor basis of Europe by the reduction of tariff duties. It certainly argues much for the protective regime that has prevailed for the past 30 years, that invention and improvement have been so stimulated by it, and competition among American manufacturers has so spurred rival machinery producers, that new world achievment is confessedly better than the accumulated mechanical experience of the old world has yet brought forth. The question of cheapness, be it remembered, does not enter into the account; there is no claim made that the American molder and machinist, whose labor enters into our machine tools, performs so much more labor in a day that the difference in wages is equalized. It is a pure case of advantage by virtue of brains and originality—through "striking out in original paths." Where would have been the incentive and the chance to "strike out" but for the fostering and encouragement afforded by a completely rounded protective system? The processes of tin plate manufacture in the United States furnish the most recent example of what Yankee ingenuity is able to accomplish, in contrast with the slow-paced improvements of our competitors across the water. Our contemporary says:

There is not a little reason to suppose that American ma-

chinery and tools will before long come into active competition with our own in neutral markets to a much larger extent than they have hitherto done. This will be one of the inevitable consequences of a reduction of the American tariff, which now appears to be imminent. Already American locomotives have displaced those of England and Germany in Japan, Australia, and South and Central America. American machinery is yearly gaining a firmer footing, not alone in outside markets, but in our own as well. The *Frankfurter Zeitung* recently published an article on American tools in Germany, in the course of which it was stated that "the manufacture of tools in the United States bids fair to surpass that of all other countries, including even England. The American implement is lighter, handier, and usually made of better material than has hitherto been employed in Europe." This is a claim—curiously enough made by a German journal of standing—which English manufacturers and tool makers would be slow to admit. But there can hardly be a doubt that the Americans have gained not a little by abandoning European traditions, and by striking out, as they have done, a more or less original path in the manufacture of axes, saws, spades, sharpening and cutting tools, screws, nails, files, and other forms of hardware and cutlery. The time has not yet arrived when the American can command as cheap labor as in Europe, but he is coming nearer to that point every day, and he is likely to be brought much nearer still by a fall in the tariff duties. Meanwhile, the American can generally produce cheaper implements and tools of a certain kind by using iron castings very liberally where English toolmakers make use of wrought iron, and by adopting, as far as possible, the same patterns for a practically unlimited supply, so that no difficulty is found in replacing any parts that may get damaged or lost.

THE computation of average freight rates on the lakes the past season, as made by the *Marine Review*, shows that the average wild rate on ore from the head of Lake Superior was 77 cents a ton to Lake Erie ports, as against $1.15 in 1892; from Marquette, 71 cents, against 98 cents; from Escanaba, 56 cents against 74 cents. Contract rates averaged $1, $1 and 85 cents respectively, from the ports named, as compared with $1.25, $1.15 and $1 respectively in the season of 1892. An important fact is to be noted, in connection with these rates, however. The wild rate is the average of daily charters through the season, and is secured by taking the sum of the established rates, day by day, and dividing the total by the number of days. The average freight paid on the tonnage actually moved is a different thing. The *Marine Review* finds, on collecting the data from shippers, that the average freight paid on ore, contract and wild, moved from the head of Lake Superior, was 94 1 cents, or 17 cents more than the average wild rate.

A PROTEST against free iron ore is being numerously signed in the Lake Superior region and by all the interests in any way connected with iron mining. The campaign will be pushed with all vigor, and with the recently developed sentiment in the Senate in opposition to the Wilson bill, and the protests which members of the House are hearing from their constituents in their holiday visits at home, there is a growing probability of the passage of amendments that will at least reduce the power of the bill for harm.

Death of Chauncey H. Andrews.

A foremost figure was removed from the industrial life of the Mahoning Valley in the death, on Christmas day, of Chauncey H. Andrews, at his home in Youngstown. He was 70 years of age and his life was one of the intensest activity. Coal mining, iron manufacture and railroad building all engaged his wonderful energies, and in all he won marked success. The development of coal deposits north of Youngstown was his first important work, and in connection with these he had an interest in the Mahoning Coal Railroad Co. The Thorn Hill mine, the Burnett, the Oak Hill, Coal Run and other mines, whose output has amounted to several million tons, were largely controlled by him and W. J. Hitchcock, the firm being Andrews & Hitchcock, which was merged in the Andrews & Hitchcock Co. the past year. With his brother he erected two blast furnaces and a rolling mill at Haselton, which are still in operation, having been greatly enlarged by the Andrews Bros. Co. He had at one time, also, an interest in the Westerman Iron Co., at Sharon, Pa. Mr. Andrews' first railroad contract was the building of 35 miles of the Niles and New Lisbon road for the Erie Railway in 1869. The speed with which the work was done was the wonder of veteran contractors, all of whom predicted that it could never be completed in the time called for by the bond. With the late William McCreery, of Pittsburg, Mr. Andrews projected the Pittsburg & Lake Erie Railroad, induced capitalists to invest in it, and had the satisfaction of living to see what is considered the most valuable short line in the United States, in operation. Later he organized the Pittsburg, Cleveland & Toledo Railroad, from New Castle Junction to Akron, and personally supervised its construction. With William McCreery he built the Montour Railroad, furnishing an outlet for the mines of the Imperial Coal Co., in which he had a large interest.

The Carnegie Steel Co.'s New Schedule.

The new sceedule of wages for the Homestead, Beaver Falls and Upper and Lower Union Pittsburg mills of the Carnegie Steel Co. has been announced to the men and will go into effect with the new year. A considerable reduction in tonnage rates—how much the firm does not make public—is involved in the new scale, yet it is probably true that if business enough can be secured to keep the machinery going, the men will make more than the employes in most other mills. The cuts, said to range from 20 to 50 per cent. are deepest in the case of high-priced men. At none of the mills are the wages of common labor put below 12 cents an hour. In the 119 inch mill, it is reported that the rollers, who received $12.25 per 100 tons will be paid $6.85; and in the 32 inch mill heaters are reduced from $3.74 to $2.50. In the former, one turn is abolished and there will be two turns of 12 hours each.

THE Mahoning Rolling Mill Co., with headquarters in Philadelphia, and mills at Danville, Montour county, Pa., went into the hands of receivers, Dec. 26. The liabilities are $340,000 and the assets $332,000. Abraham S. Patterson, the president, said that the receivership was due to the financial stringency, crippled trade, and as Mr. Patterson said with sarcasm, "Cleveland for President and the Wilson tariff bill." The plant consists of ten double puddling furnaces, six heating furnaces, and three trains of rolls, having a capacity of 300 tons of skelp iron per week. The officers of the company are Abraham S. Patterson, president; William C. Frick, secretary and treasurer; A. S. Patterson, Joseph Storm Patterson, Justice Fox, Jr., of Philadelphia; Charles L. Bailey, of Harrisburgh, and Isaac K. Grier, of Danville, directors. The works at Danville employ 800 hands and were running on full time until a week ago. All the hands have been discharged except a few in the foundry and machine shop.

GEO. H. ANDERSON & CO., fire brick manufacturers, of Pittsburgh, during the past summer and autumn have furnished new and complete generators and superheaters to a number of gas companies for producing illuminating gas out of water and oil. Two complete furnaces were made for the Richmond, Va., Gas Co., and one each for Salem, O.; Wilkesbarre, Pa.; Middletown, N. Y.; Canton, O., with others under contract. The old way of making gas is rapidly giving way to the newer and more approved methods, producing better gas, and at less cost.

The Hubbard, O., rolling mill is to be leased from the Mahoning Valley Iron Co. and run on the co-operative plan by Wm. F. Bonnell and a number of iron workers. The men agree to work six weeks without drawing pay and then to take 50 per-cent and leave the balance for 90 days. The Hubbard bank is to advance $6,000 to buy stock, and merchants will receive orders on the company for merchandise. The Hubbard Co-operative Iron Co. will be incorporated and Wm. F. Bonnell will be manager.

AMONG THE IRON MINES.

The number of men employed in the mines in and about Ishpeming, Mich., has been ascertained by the Marquette *Mining Journal*, which puts the total at about 1,600. The Lake Superior Iron Co. is working 593 of this number, about 60 of whom are employed at the company's Section 21 mine, Winthrop location. During the past 10 days, this company has increased its force from 563 to the number mentioned above. The Cleveland-Cliffs Co. is working 150 at the Salisbury, 70 at the Hard Ore, 45 at the Lake Shaft, and 20 at the Cleveland Hematite. At the Salisbury, they have been working only one shift since the cave-in occurred, near the engine house, two months ago. For several months prior to that, about 250 men were working there. At the Lake Angeline there are 400, the force having been reduced a little when the old mine closed down, a few weeks ago. The Winthrop is working 350, a few less than were employed there during the fall, a number of the surface hands having been laid off when winter set in.

John T. Jones, of the Biwabik, agrees with the statement made in these columns, several months ago, that the amount of Mesabi ore marketed next year will depend largely upon the amount furnace managers find they can use advantageously in their mixture. Sixty per cent. is the maximum percentage under present practice.

No material change is noticeable at the Aragon. About 240 men are employed. Owing to the fact that the pumps in the new water shaft had become pretty well worn from pumping so much sand, the work of sinking was temporarily suspended, last week, and the men moved to the mine proper. As soon as necessary repairs have been made, sinking will be resumed. There remains about nine feet more to sink.—[Norway Current.

James Corrigan, of Corrigan, Ives & Co., commenting on the position of Maj. Baldwin, of the Duluth district, on the free iron ore proposition, says: "Maj. Baldwin states that it is better to have $1 per ton profit on 3,000,000 tons than $1.25 on 1,000,000 tons. This may be all true, but even with the duty on foreign ores, there has been no time in the last 12 months when anything like $1 per ton profit could be made on Mesabi ore, and if the duty is taken off and reduces the price 75 cents, there will be no profit whatever on Mesabi ore, even though they can mine a little cheaper than other ranges. There will not be 3,000,000 tons of Mesabi ore required to fill the market if the foreign ores come in free of duty. I think Maj. Baldwin does not take into account that the Mesabi range is a long way from the point of manufacture and consumption of iron, and that in competition with free ore the 25 cents per ton may look to be quite a profit, leaving the dollar feature of it out of the question."

The Norway *Current* points out the improbability of the newspaper report of an offer of $800,000 for half the fee of the Pewabic mines, growing out of the Carnegie Steel Co.'s recent negotiation for the Pewabic's output next year: "In the first place, Mr. Hyde only owns a half interest in the fee, the Pewabic Co. owning the remainder, and the question is, will the present condition of the iron trade or of the Pewabic mine warrant the paying of $800,000 for a half of the fee? The interest on that amount at 6 per cent. would be $48,000 per year. Will the Pewabic produce enough ore to return a royalty of $96,000 a year, and if so, how long; and where is the principal to be earned?"

Establishing Iron Manufacture in Chile.

A synopsis of the prospectus of a company for the manufacture of iron and steel in Chile, based upon the concession granted by the Chilean Congress to Charles E. Lister, has been received by the Bureau of the American Republics. Mr. Lister is granted, for three years, free, all the scrap iron and steel belonging to the State, and pieces of rail not exceeding 60 centimeters in length, the three years to count from the time the works may be in running order. At the conclusion of this period, the owners of the concession will be entitled, during a further period of 15 years, to the same materials, subject to the payment of a nominal price of 7s. 6d. per ton. They will also be entitled, during 10 years, to import, duty free, sulphuric acid, muriatic acid, borate of soda, sal ammoniac, and metallic antimony to a total value of $15,000 per annum, and the sole and free use of 100 meters of sea frontage in the Bay of Talcahuano for 25 years. It is proposed to erect the works at Talcahuano, in close proximity to the bay, and the sea frontage granted will be used for wharves and warehouses. Mr. Lister estimates that 10,000 tons may be produced from the scrap iron available in Chile. The capital of the company is $1,000,000. Heretofore the scrap iron of Chile has been sold at a very low figure and exported. It is hoped that the company will lead to the development and extension of iron mannfacture in Chile, and that ultimately it will be to the company's interest to produce iron from the ore.

Chicago Trade Notes.

Mr. H. A. Keith, for the past fifteen years with the Chicago Foundry Co., has recently connected himseif with the East Chicago Foundry Co., and will in the future devote his energies to their business. The officers of the East Chicago Foundry Co. at present are: L. Laflin, president; John P. Laflin, secretary and treasurer, and H. A. Keith, manager. The works of the company are in East Chicago, Ind., and the general office 716 The Rookery, Chicago. The business of the company is the manufacture of sand rolls, ingots, molds and heavy castings of all descriptions. A specialty is made of heavy rolling mill work.

Mr. J. W. Duntley, sales agent for the National Machinery Co., of Tiffin, O., with office at 1518 Monadnock Block, Chicago, has recently sold the entire blacksmith shop equipment of tools for a new car plant at Lenoir, Tenn.

The Pratt & Whitney Co., of Hartford, Conn., have recently enlarged their Chicago quarters at 96 to 104 W. Washington St., until they occupy twice the floor space they had formerly. The Chicago agent of the Pratt & Whitney Co. is the Chicago Screw Co, and the sale of their tools is under the immediate charge of Mr. G. L. Holt.

The Sargent Co., of Chicago, manufacturers of brake shoes and steel castings, have recently re-opened their city office in room 519 of the Phenix building. They report business in brake shoes very good, and are in consequence running their iron foundry on full time. They expect to get their steel casting plant, which is now idle, started up within the next two or three months.

Personal.

We note with regret the death of Col. L. C. Boone, at Salem, O., Dec. 20. Col. Boone had been abroad within the year, making a stay in France in the hope of benefiting his health. He was secretary and treasurer of the Buckeye Engine Co., of which he was one of the founders, and his sagacity and enterprise have contributed much to the success of that well known company. Col. Boone was also connected with other Salem industries, and his taking off will be sincerely regretted.

The Prentiss Tool & Supply Co., 59 S. Canal st., Chicago, have engaged the services of Mr. Allen Ransom, formerly with the Lodge & Davis Machine Tool Co., to take charge of their city business. Mr. Ransom is well known in Chicago, having been connected with the machinery trade there for several years, and in him the Prentiss Tool & Supply Co. have made a valuable addition to their force of salesmen.

Mr. L. B. Whitney has severed his connection with the firm of A. Whitney & Sons, of Philadelphia, and formed a partnership with Mr. DeWitt W. Smith. The new firm will represent several manufacturers of machinery.

Mr. J. K. Bole has resigned the position of general manager of the Otis Steel Co., of Cleveland, to devote his time to other interests. Mr. Bole is one of the receivers of the Valley Railway.

THE J. H. & D. Lake Co., Massillon, O., reports business gradually on the increase again and every indication for fair business after Jan. 1. The company shipped recently friction clutch pulleys to Tacoma, Wash.; four friction clutch pulleys to Santiago de Cuba; 20 to Cleveland, O., and to numerous other points throughout the United States.

THE Newberry charcoal furnace, at Newberry, Mich., will go in blast about Jan. 1. The furnace company takes this step largely for the purpose of giving work to their men at a time when their need is most urgent.

LAUGHLIN WATER TUBE BOILER.

The accompanying illustrations show a new type of water tube boiler, recently patented, which has given most satisfactory practical results. Fig. 1 shows the entire boiler; the second illustration indicates the manner in which the tube sheets are inclined to receive the tubes at right angles. The boiler was designed by a large user of steam power, to meet the demands of the times, for an economical steam generator, combining strength, durability, accessibility and efficient capacity. As shown, it consists of two short cylindrical ends of large diameter, connected by a system of straight interlocking inclined tubes. The flat surfaces of ends are made to resist any desired pressure by stay bolts, proportioned in number and size to the duty required. By means of strong diaphrams placed in the end spaces, the circulation is directed and controlled, so as to prevent opposing currents, and assist, rather than interfere, with natural laws. Ample provision is made for a free return of the water after passing up through the tubes, the return spaces being largely in excess of the combined area of the uptake tubes.

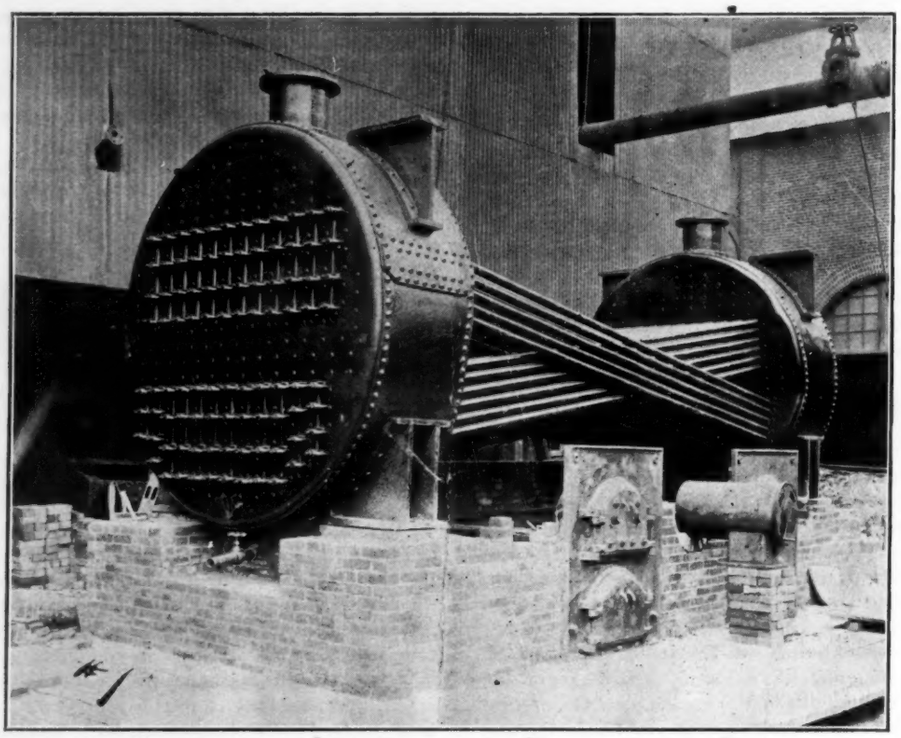
This provision secures dry steam, and prevents priming even when the fires are forced the hardest. The circulation is very rapid, and in practice exerts a cleansing effect on the tubes, the scale forming impurity in the water cannot find a resting place in the rapid flow of the uptakes, but is precipitated in the slower current of the return spaces, and falls to the bottom, from which it is discharged through the blow-off valves.

The steam space is above the water line immediately over the opening of the top row of tubes. The arrangement is simple and compact. In front of each row of tubes, an oblong opening in outside heads affords access for inspection or repairs, these openings are closed by suitable hand hole plates, forming a tight and secure joint, yet easily and quickly removed when required.

The grates occupy the space below the tubes between the end cylinders. When convenient to do so, the firing is done from the side, but can be done from one or both ends. Owing to its rapid circulation, this boiler permits the use of small tubes, without risk of obstruction, thereby very largely increasing the proportion of heating surface to grate. This increased efficiency is desirable everywhere, but especially so for marine use, where decreased weight and increased capacity of boiler are important factors in the problem of economy and speed.

A plant of 450 H. P. of these boilers has been in use for nearly a year, and a larger plant of 750 H. P. since April last, the latter fired by blast furnace gases. In both cases their performance has been entirely satisfactory in every way.

Further information may be obtained by addressing the inventor, Henry A. Laughlin, of Pittsburg.



LAUGHLIN WATER TUBE BOILER.

Getting Down to 90-Cent Coke.

"Coke production and output remained about stationary last week, says the Connellsville *Courier*, production being 80,000 tons and output nearly 4,800 cars, indicating the shipment of a little stock coke and showing that the firing up of idle ovens has been in response to the legitimate demands of trade. This week about 500 more idle ovens will be added to the active list. The price of coke continues downward under the influence of continued cutting in the wild scramble for orders. We hear of sales now below the dollar mark, and our prediction of 90-cent coke, made a couple of months ago, appears to be on the eve of confirmation. As prices go down, wages follow suit. The situation contains no consolation for any interest directly or remotely connected with the trade save only the consumer. The circular prices of coke are as follows: Furnace coke, $1.35; foundry coke, $1.65; crushed coke $1.75; all per ton of 2,000 pounds on board cars at ovens. Crushed coke sells up to the quotation, but both foundry and furnace coke are cut all the way from 15 to 30 per cent. We hear this week of one small order going at 95 cents. There is a disposition on the part of most operators, however, to call a halt at the dollar mark.

THE specifications of the New York, Lake Erie & Western have recently been altered to permit the use of soft steel without reaming, instead of iron, provided equal sections are used and the physical tests show the following results: Ultimate strength, 54,000 to 62,000 lbs. per sq. in.; elastic limit not less than 30,000 lbs. per sq. in., and a minimum elongation of 20 per cent. in eight in.; also the usual bending test, 180 degrees, before and after heating to a light yellow and quenching in cold water to a curve whose inner radius is equal to the thickness of the specimen, without sign of fracture. However, medium steel is still required for eye bars and pins.

AT Portland, Ind., the largest gas well ever drilled in that section has been completed. A test proved it good for 6,000,000 cubic feet daily.

J. T. WITTY, 1606 N. Collins st., Joliet, Ill., is in the market for a second-hand engine and boiler of ¼ to 1 h. p., in good condition.

ON THE EDITORIAL TABLE.

The holiday number of *Our Little Ones*, published by the Russell Publishing Co., Boston, is brimful of seasonable and engaging stories and illustrations for little people. It is one of the best juveniles extant.

A very creditable holiday and industrial number of the Duluth *Evening Herald* comes to us—24 pages of specially prepared matter printed on pink paper. With manufactured products totaling a value of $13,000,000 in the year, nearly 7,000 people given employment and $3,000,000 paid out in wages, as the *Herald's* figures represent, the position of Duluth is one of exceptional present prosperity and of abundant promise.

Outing for January, the holiday number, is beautifully illustrated and presents a pleasant store of seasonable reading. Prominent features of the number are: "Ivan of the Mask," by Ella Loraine Dorsey; "Following Dickens with a Camera," by H. H. Ragan; "A Christmas Fox-hunt in Old Virginia," by Alex. Hunter; "Nomads of the North," by C. J. Cutcliffe Hyne, and "In the Land of Josephine," by Walter L. Beasley.

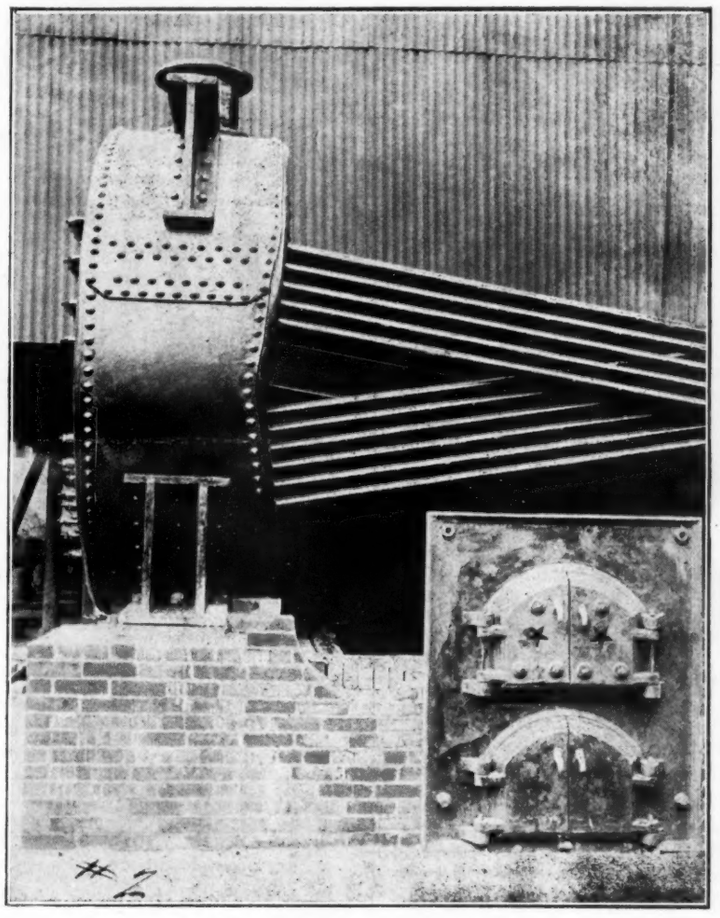
"Chain Belting" is the theme of type and illustration, in the latest special catalogue of the Jeffrey Manufacturing Co., of Columbus, O. The claim to the manufacture of the largest line made by any concern in the world, is optically reinforced in this catalogue by page after page of links of varying patterns and sizes. The Jeffrey detachable chain links are shown in full size, together with their various attachments. The Jeffrey roller carrier chain, which is made up with or without attachments, is of best malleable iron, with malleable iron and steel pins. The working strains of the roller chain links are indicated in every instance, and these links also are shown in full size. The Jeffrey steel roller chain, with thimbles, is especially recommended for driving purposes. The steel chains are made to work on standard sprocket wheels to replace malleable chains. Illustrations are given in the concluding pages of the catalogue, of the Jeffrey bucket elevators, traction wheels for elevators handling ores, broken stone, etc. The manufacturers solicit the inquiries of firms desiring to acquaint themselves with the most approved method of handling material of any description, in bulk or package.

The January *Lippincott's* has "The Colonel," by Harry Willard French, for its complete novel. Gilbert Parker furnishes the opening chapers of a serial story "The Trespasser," which will run through six numbers of the magazine. There are a number of excellent short stories, and the poetry is of unusual merit.

From the J. D. Smith Foundry Supply Co., of Cincinnati we have received supplementary catalogue No. 16, which calls particular attention in its 52 illustrations to Monk's molders solid steel tools. These include a number of late shapes and sizes of handy tools.

In *Electric Power* for December there are two excellent articles by qualified experts, on the "First Three Phase Transmission Plant," and "Electrical Haulage in the Brock Coal Mine," both well illustrated, and two shorter ones on "The Trolley Canal Boat" and "Electrical Cranes" also illustrated.

THE Bureau of the American Republics has received information that the newly organized Mexican National Steel Co., with a capital of $3,000,000, is now in possession of the large iron and steel plants and deposits formerly controlled by the Durango Iron Mountain Co. It is expected that Richard Honey will be chosen president. The object of the company is to operate not only the mining of the great deposit of ore at Durango, but to put in working order various manufacturing establishments already built at different points in Mexico. A representative of the Durango company is said to have expressed a willingness that the import duty on iron and iron ores be materially lowered if the Mexican Government will then observe standard rate of duties and treat all alike. The Durango home plant is said now to represent an expenditure of $600,000.



LAUGHLIN WATER TUBE BOILER.

IN the 10 days ending Dec. 20, there were put in the yards of the American Pig Iron Storage Warrant Co., 8,700 tons; withdrawn in the same time, 1,800 tons. Net stock in yard, Dec 20, was 83,800 tons.

GLASS OIL CUP FOR ENGINE BEARINGS.

The illustration on this page represents Lunkenheimer's "Crown" index sight-feed glass oil cup, for dynamos and engine bearings. This cup is provided with an index device for regulating the flow of oil, and an indicator arm turning on the lid to mark the notch giving the desired feed. The feed can be instantly turned off and on again at will, by replacing the index lever in the notch of the indicator arm. When the index arm is closed the lever can be left to stand up out of the notch, thus acting as an indicator to show from a distance that the feed is shut off.

It is often the case where a number of cups require different feeds, especially before starting the engine, that an extra amount of oil is wanted. This can easily be secured with the "Crown" without losing the original feed, by moving the indicator arm a few notches to the right, and when the established feed is again required, it is only necessary to replace the arm in the index slide, which marks the established feed.

These cups are all made of cast brass, handsomely finished, and are heavy and durable. The oil will not leak out between the brass and the glass parts as is the case with ordinary spun brass cups. Wherever they have been put in use, the "Crown" cups are giving the best satisfaction. They are made in eight sizes, holding all the way from ⅝ ounce to 18 ounces of oil.

Besides the "Crown," seven other styles are made by the same company, for various purposes; all of them are fully described and illustrated in their catalogue, which will be mailed to any address on request. These goods are manufactured by the Lunkenheimer Co., of Cincinnati, whose specialties are all well known to power users.

THE tin plate workers of Neath, Wales, have accepted their employers' ultimatum of a 10 per cent. reduction of wages. Their action is considered important, as it is expected to lead to a change in the standard of wages fixed in 1874.

THE talked-of reduction to $4 for puddling in the Mahoning Valley cannot take place for three months in any event.

MACHINE SHOP AND FOUNDRY.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, Dec. 20th, 1893, in Rooms 702-3, Temple Court, Chicago, President G. W. Sargent in the chair. The meeting was one of the best in attendance and in interest that the association has yet held. The minutes of the previous meeting were read and approved.

The following amendment to Article 8 of the by-laws was presented and adopted: "Article VIII. All proposals for membership shall be made in open meeting by any member. The application, with the endorsement of the member making the proposition, shall be voted upon by the members present, a majority electing."

The following letter from Thomas D. West, of Sharpsville, Pa., in regard to his paper on "Center Blast Tuyeres," was read by Secretary Gardner:

To the Officers and Members of the Western Foundrymen's Association, in session December 20th, 1893, Chicago, Ill.:

GENTLEMEN:—Since the publication of my paper on "Center Blast Tuyeres," which I read before your association, October 18th, 1893, it has come to light that one Mr. B. H. Hibbler received patent papers for a center blast, August 13th, 1867, the number of his patent being 67,651, a copy of which is here presented for your investigation.

This matter, coming up as it did, might lead some to think I had stolen an idea and imposed upon the confidence of this association in presenting my paper. I can conscientiously say I knew nothing of such a patent being in existence, and thought the idea original with myself and Mr. Widdowson of Mankato, Minn.

I send you a certificate from a patent attorney, showing I had good grounds for thinking my ideas original, and will now say, after seeing Mr. Hibbler's patent claim, that had I followed my attorney's advice, I feel I could have secured a patent had I desired to do so; and, while we must concede to Mr. Hibbler the credit of first conceiving the idea of a "center blast," I feel there is credit due myself for having presented a device that is practical for every-day use.

As regards the practicability of Mr. Hibbler's device, I leave in your hands to decide; but before doing so, I would be pleased to have you read and digest the article which I have on this subject in November and December issues of the *Foundry*.

I hope you will give this matter your careful attention, and can find by the evidence I present for your investigation that, in presenting my paper before your association, I did so in good faith, believing Mr. Widdowson and myself original with the center blast idea, and in no wise desirous of detracting credit from any one, the sole aim being to benefit the association and its profession.

Yours truly,

THOS. D. WEST.

The members expressed themselves fully satisfied of Mr. West's straightforwardness in the matter, and no formal action was taken.

The paper of the evening, by Hon. E. A. Wheeler, of Sharon, Pa., was then read by the secretary, as follows:

Furnace vs. Foundry Practice.

Pig iron contains about 94 per cent. of pure iron; the other 6 per cent. is chiefly composed of carbon, silicon, manganese, phosphorus and sulphur, and upon the proportion of these elements depends the quality of the iron. Through the aid of chemistry we have learned in what proportion these ingredients should be contained in the pig iron in order to make the best iron, steel, or castings. Carbon and silicon are indispensable elements, but phosphorus and sulphur are rank poison, and should be eliminated as much as possible. The furnace operator knows how hard it is to make iron containing the right proportion of carbon and silicon. Although the ores, coke, and limestone are carefully weighed into the furnace, the hot blast is held at the same temperature, and all the conditions are the same as near as possible, yet we seldom get two casts alike, as the following report of one day's work of six casts, at our furnace, will show:

	Silicon.	Sulphur.
First Cast	2.28	.013
Second "	2.43	.009
Third "	2.40	.010
Fourth "	2.00	.020
Fifth "	1.94	.035
Sixth "	2.04	.024

You will see from the above analyses the constant change

that is going on in the furnace, and, although the iron was No. 1 in grade, and no difference could be noticed in the fracture, yet it would work very different in foundry castings. This explains why furnacemen sometimes get letters from their customers which read about as follows:

"The last car of iron you sent us is not good; can't use it; plates crack, and the castings are too hard to work in lathe, and it spoiled our last heat."

Now, a little knowledge of chemistry would have saved all this trouble. The last car was too high in carbon and too low in silicon. Had the foundryman said in his order, "Ship me one car of iron, same as last, silicon 2 or 3 per cent.," as the case may be, he would have had the same castings as before, with the same mixture, and no uncertainty about it. Or had he known that the iron was low in silicon, and added a little high-silicon pig iron, he would still have been all right. The fact is that silicon plays so important a part in regulating the carbon in iron that no well regulated foundryman can afford to use iron without knowing how much silicon it contains; and with that knowledge he can always have the kind of iron he wants in his castings. Too much silicon makes iron weak, and too little makes the iron hard. Good castings for machine work should contain from 2 to 2½ per cent. of silicon; stove plate, 2½ to 3 per cent. If the foundryman will keep on hand a stock of silvery grey iron, running 5 per cent. in silicon, and knows what his strong irons run in silicon, as he always should know when he buys his iron, he can easily make a correct mixture in the office and not depend upon his wizard mixture for the quality of his iron. Every foundryman should keep his own chemist, or buy his iron on analysis and demand a chemist's card with each car. If this rule is observed, Nos. 2 and 3 and even grey forge can be used and very much cheapen the stock and make equally good castings. The puddling furnace must go, as soft steel is rapidly taking the place of iron, and then the white and mottled iron will have to be melted over in the blast furnace. Forge irons will have to be used in the foundry, and there will be no trouble in doing so, provided you have the correct analyses of the iron, and use the right amount of silicon in each charge in the cupola.

The quality of the iron in the blast furnace is governed by the temperature; if the furnace is hot the silicon runs up and the sulphur down; if the furnace is cold the silicon runs down and the sulphur takes its place and we get No. 3, or maybe white and mottled iron. I would think a hot or cold cupola would have the same effect on the iron. If the cupola is hot the iron will take up carbon and silicon from the coke and the castings will be soft and good; but if the cupola is cold the iron will take up sulphur and the castings will be hard and poor.

There are so many contingencies connected with the operation of the cupola that it is hardly safe to make any suggestions without knowing all the conditions. The first question is the quality of the coke. If the coke is poor and full of sulphur you cannot get good castings. A great deal depends upon the blast, whether soft or strong. My impression is that most foundrymen use too strong a blast and melt the iron at too high a zone. A soft blast will take a little longer to take off a heat, but there will be great economy in coke and less oxydizing and a better quality of iron when melted. It is very important to use the right per cent. of lime for flux, as it purifies the iron and covers it with slag and keeps it hot and prevents oxydizing. Forty years ago the writer was engaged in the foundry business making stoves, and although all other branches of the iron and steel business have been revolutionized, the foundry business seems to plod along in the same old rut, and is governed by the rule of cut and try, and I cannot see that there has been any improvement. Iron is still sold by the fracture and graded Nos. 1, 2 and 3 and silvery grey for a softener.

The foundryman should know how much silicon and sulphur each number contains. I notice your association is talking of one chemist to do the work for all the foundries. That plan will not work, as most of the foundries do not order iron until they want to use it, and often say in the order to ship quick and send tracer to hurry it along. How could they wait to send drillings, perhaps hundreds of miles, and then wait their turn for the analyses? That is too slow even for the average foundryman. All pig iron for making steel, either Bessemer or open hearth, is sold on analysis, and why should not foundries adopt the same rule? For years we have analyzed every cast at our furnace for silicon and sulphur, and once a day for phosphorus. Each cast is piled by itself and the date and number of the cast is marked thereon, and by referring to our chemist's book we know just what it is and would be glad to send anyone buying iron the correct analysis with each car we ship. A prominent steel man once said to the writer: "I don't care what your iron is made of so it has the correct analysis. I don't care if you make it from all mill cinder." He knew very well that the analysis would not be correct if made from cinder, and so with the foundry; you can depend upon the iron if the analysis is correct.

The writer when in England a few years ago was shown through a large foundry and saw an attachment to an ordinary cupola which seemed to be a good arrangement and was new to him. It consisted of a square brick bosh inclosed in cast plates to bind it, with an arch roof over the top and high enough to take in the tap hole or trough from the cupola, and was large enough to hold the entire heat that was wanted. The bosh had a hole through the arch tap near the front and a gas flue about 8″ in diameter leading from it into the cupola, say half way up the side, to carry off the gases. The operation was as follows: When the cupola was fitted up the bottom was so arranged that the iron and slag as it melted all ran to the tap hole, and as it was left open and quite large, of course it went into the bosh which had been well dried out and heated up before the blast was put on, and the blast would pour a large stream of burning gas into the bosh with the iron and slag and keep the iron hot. The practice was to melt the entire heat before commencing to tap out of the bosh for use. I was told by the foreman that this was a great improvement over the old way. First the iron was homogenous and the quality was improved, and as the iron was covered with slag it would keep hot enough for use for at least two hours, and then when you commence casting there was no delay wanting for iron, as the melting was all done before the moulders quit work. There was one cramp in the arch top such as is used on the neck of a puddling furnace that could be lifted off to get in to repair or start a fire to dry out and heat it up. The whole thing was so simple and inexpensive that I think anyone could build such an attachment to his cupola from the description I have given, and if I were in the foundry business I should certainly try it. I inquired of the foreman if such an arrangement was common and he said not; that it was a trade secret, and other foundrymen were not allowed to go through their works.

It is a well known fact that every time you melt iron in a cupola you deteriorate its grade and you have to use new high silicon iron when melting again to replace the silicon burned out in melting. In a blast furnace it is just the reverse. We can take white and mottled iron or old burned hot blast pipes and grate bars and melt them over and the whole thing will come out good grey iron if the furnace is working well, and it melts well and seems to improve the working of the furnace. If fed in the furnace at the rate of 5 or 10 per cent. of the stock used it will not require any more fuel than if it was not used. I don't see why a cupola could not be constructed, something after the lines of a blast furnace, that would convert old hard scrap into good, soft, merchantable iron. The cupola would have to be, perhaps 15 feet high, and have a closed top so as to conduct the waste gases down into a small hot blast, and if the blast can be heated up to 900 degrees it will do the work. A little lean ore high in silicon might be required with the lime to make sufficient slag. I think it would pay some firm that has plenty of means to experiment in this line.

SUPPLEMENTAL HINTS FOR FOUNDRYMEN.

Always melt your iron hot and draw it off about as fast as melted and cool in ladle, otherwise you burn out the silicon. Don't try to save coke at the expense of the quality of your iron.

Always get the correct analyses for silicon with each car of iron you buy. Get the card of the chemist that made the analysis, with his signature, to be sure that the analysis is correct.

Silicon governs the quality of the iron in all cases, unless the iron contains over 1 per cent. of manganese. Manganese makes the iron hard.

The price of all foundry iron should be governed by the per cent. of silicon that it contains. The higher the silicon the more valuable the iron, because the more scrap it will carry.

Foundrymen often pay very high prices for strong pig. If they will take the common scrap about their foundries and mix enough high silicon pig with it to make the castings contain 1¼ to 1½ per cent. silicon, they will find that they have a very strong casting.

Stove plate should contain 2½ to 3 per cent. of silicon.

Machine castings, to work soft, should contain 1½ to 2 per cent. of silicon.

Machine castings hard and strong to stand wear and friction should contain 1¼ to 1½ per cent. of silicon.

Castings containing 1 per cent. of silicon or under, work hard and flinty under the tool, and are only fit for plow castings or chilling purposes.

Add ¼ of 1 per cent. more silicon in your mixture than you want in the castings for loss in melting.

If your iron is too high in combined carbon, and too hard, add more silicon.

If your iron is very grey and soft, and high in graphitic carbon, and runs sluggish, add silicon.

If your iron is too soft and weak for your purpose, reduce the silicon.

Mr. W. D. Sargent, Chicago: How about the next to the last hint? It seems to me that it contradicts the one preceding it. He prescribes the same remedy for exactly opposite conditions.

Mr. H. L. Hollis, Chicago: I do not think I agree entirely with the amount of silicon which he prescribes for the different kinds of working.

Mr. Sargent: There is the question of obtaining the analyses. Is it very difficult to obtain the analyses signed by a chemist?

Mr. Hollis: I think most furnaces have each cast analyzed. It is easily done. The Illinois Steel Co. grade every car in that way. I think a great many furnaces do it.

Mr. C. A. Sercomb, of Milwaukee: I think every furnace company will furnish an analysis.

Mr. Hollis: The value of grading depends upon the furnace piling each cast separately at a time. Unless it is done in that way, the analyses would be of little value.

Mr. Sargent: What will be the variation between the grades of iron as to the silicon?

Mr. Hollis: Sometimes there will not be any. The grade of the iron in a general way shows the silicon contained.

Mr. Sargent: It would not then be possible to follow out Mr. Wheeler's idea, and grade iron by the silicon?

Mr. Hollis: The grade of the iron does not mean necessarily the silicon contained in it.

Mr. Sargent: That might be changed?

Mr. Hollis: Yes.

Mr. Sargent: Then it would not be advisable to select by the fracture?

Mr. Hollis: No.

Mr. Sargent: How would you grade it? By the silicon?

Mr. Hollis: You can as well grade by silicon, and give it a number.

Mr. Sargent: It seems to me it would not be as satisfactory a plan as the present one.

Mr. Wm. Moore, of Joliet: The steel furnaces grade their iron according to analysis rather than fracture. It has been my experience that we have had No. 3 iron show higher silicon than some iron that we would grade No. 2. It seems to me, in looking over the paper, that the author places a little undue stress upon the silicon, and ignores somewhat the fact of sulphur, which is certainly as important a factor in the fracture, and also in affecting the working of the iron melting, and afterwards—the character of it right through.

Mr. Hollis: In regard to the point that the last gentleman raised—that No. 3 iron sometimes gets higher silicon than No. 2—I would say that the physical conditions in which it is cast would largely affect the grade. Anything that would chill the iron quickly in the pig bed would lower the grade. That would account for No. 3 iron having higher silicon than the higher grade.

Mr. Moore: Is it not a fact that, taking two grades of iron—say 2 and 3—the difference in fracture is due to either one of these two causes: the physical conditions at the time of the cast, or the presence of sulphur?

Mr. Hollis: I think not. I think the sulphur by itself could not account for that difference in the fracture of the iron, but the high sulphur almost invariably accompanies a cold working in the furnace, and such a condition gives a low silicon iron and a closer fracture—closer grain.

Mr. Sercomb: Is it not a fact that in the last year and a half, since there has been an endeavor o sell iron on analyses, it has been somewhat of a failure? The furnaces may sell the iron with a guarantee that there is a certain amount of silicon. You are depending upon some chemist, who may make a mistake. The different conditions of the cupola would cause the different fractures in the different irons, as regards softness or hardness, and you make the complaint to the furnace that the iron is not as it should be, with no redress. I believe the foundryman will have to make a study of these analyses and experiment quite a little before he becomes thoroughly versed in the matter. If in the different casts there is such a great variation, if there would have to be a large number of the pigs drilled to get the exact analyses, then it does not seem much work saved; for to day, when you want to buy pigs, they will break every one for you.

Mr. Hollis: I think it is common with most blast furnaces to take a sample out of the first third, and then another out of the second third, and so on, and then use this as a sample for the cast, which in almost every case would fairly represent the car.

Mr. G. M. Sargent: Do you think it advisable to purchase iron by percentage, having it guaranteed, rather than by the number?

Mr. Hollis: I think most decidedly so. A sample of cast or pig iron can be taken while running into the pig beds.

Mr. Sercomb: How would you account for the fact that iron that you had used for a year and a half gave perfect satisfaction in every respect, so that you adopted it, and then you would make a purchase of 500 tons that was in such a condition that you were not able to use it at all? It was the same iron, as far as I was able to see, yet the iron ran to such a degree of hardness that it had to be rejected.

Mr. Sargent: It would seem to me that a chemical analysis ought to settle that matter.

Mr. Sercomb: We did not understand anything about analysis, neither did the furnacemen.

Mr. Moore: I presume that most of the foundrymen have had somewhat the same experience. The old, reliable casts fail us at times. We had an experience with hard iron, during the past year, that was quite an expensive one, and we got in quite deep before we knew it. The question was, where was the trouble? It was in several grades of iron, and we started at once to ferret the thing out. We started to analyze our iron. We had been getting in some new iron. We could find no trouble with the iron. We then took up the coke, which we thought was all right. We found the coke to be running from one per cent. up to one and one-fourth in sulphur, and that was "the nigger in the wood-pile."

Mr. Sercomb: I would say that we changed our coke, and then went back to the same coke again. We found that we would have to change our iron. We then tried Ashland iron, and that went right for awhile, but pretty soon it became as hard as flint, and we had to reject it.

Mr. Moore: I have understood that that condition in the casting is liable to be produced by a high manganese. I would like to hear an expression of opinion.

Mr. Sercomb: I have talked with many foundrymen, and no one could give me an explanation of the trouble.

Mr. Sargent: We have used manganese iron, and never had any trouble.

Mr. Moore: How high?

Mr. Sargent: As high as three or four per cent.

Mr. Sargent: I would like to ask if any one can tell what the percentage of silicon to the shrinkage is?

Mr. Hollis: I think you will find that information in a paper by Mr. Keep, in the Transactions of the Mining Engineers. It is not in direct ratio, as I would call it, up to a certain point. I do not recall the percentage enough to tell it.

Mr. Sercomb: After all, has not analysis been somewhat of a failure?

Mr. Hollis: I think not when analyses are properly applied. I think the way most foundrymen have used them they have been worse than useless. I think the trouble has principally been that no attention whatever has been paid to sampling.

For instance, a foundryman will have some trouble, and go out to his stock yard and take up one piece of iron—it may be an odd pig—and then take that for the analysis of the whole, instead of systematically going through his pile and taking a large number of pigs. The same thing is true in the way the coke is sometimes analyzed. They will take one piece, which, as a rule, is far from being an average sample. If they would pay more attention to the sampling, I think they would get better results.

Mr. Moore: What do you consider a fair sampling of a car—how many pieces?

Mr. Hollis: I think that would depend largely upon the appearance of the iron. If the fracture indicated a variety, it might be 20, or it might be 25, or more. If it was fairly uniform, it would be only five or six, possibly eight or ten, unless you should know that it was a single casting.

Mr. Moore: Most cars are from single castings.

Mr. Sargent: According to Mr. Wheeler, it is a very simple thing to follow up an analysis and get what you want. If Mr. Wheeler is correct, it seems to me that the foundry business is far more simple than we had supposed.

Mr. Hollis: I hardly think that matter is quite as simple as you say. Given a certain brand of iron, in which the phosphorus is fairly uniform, then I think what Mr. Wheeler says is largely correct. The phosphorus, manganese and silicon being uniform, the ratio of combined carbon that determines the physical properties of that iron is largely dependent upon the silicon or accompanies the silicon.

Mr. Sargent: It seems to me, as I stated before, that too much stress has been put upon the value of silicon alone as a regulator of cast iron. I am quite certain that the silicon can be all right—in fact, we have made castings that were hard, with the silicon three and one-half per cent., which is altogether too high, I think, in proportion. We knew at the same time that our sulphur was running from .08 to .09 or .10. There was no question but that the silicon was high enough.

Mr. Hollis: I think there is no question that when you get beyond a certain point with silicon you begin to harden your iron. When you have 3½ per cent. in your iron, all things being equal, you have a little harder iron.

Mr. Moore: You then consider that sulphur is not an important factor?

Mr. Hollis: I think the sulphur by itself is not. It is the chemical properties that usually accompany high sulphur that are detrimental. High sulphur goes with a cold working furnace, low silicon and white iron.

Mr. Moore: In the case I mentioned, the sulphur and silicon were both high, and the iron in a normal condition.

Mr. Hollis: I think that is exceptional.

Mr. Moore: One point in the paper, which is of benefit to foundrymen, is brought up by Mr. Wheeler's speaking of the loss of silicon in melting. It is a question on which we are all at sea. I am interested to know whether the statement that it is about one-fourth of one per cent. is to be taken as reliable or not. It would be very interesting to have that statement substantiated. My impression has been that it was considerably larger. I presume that would vary somewhat, according to the condition of the cupola.

Mr. Sargent: It is somewhat difficult to figure the loss of silicon while you run through two or three different mixtures.

Mr. Moore: I mean with a standard mixture. Of course, it would be a very complicated thing if the mixture were varied during the heat.

Mr. Hollis: I should think Mr. Wheeler meant other things being equal. There is no question but that the loss in silicon is largely dependent upon the working of the cupola.

Mr. Moore: What, in your judgment, would be the conditions that would produce the greatest loss in silicon?

Mr. Hollis: With what kind of mixture? Running average mixture, with the two per cent. silicon, I think cold working, other things being the same.

Mr. Moore: The cupola running cold?

Mr. Hollis: I would answer that question in another way. The hotter the iron, the greater the tendency to absorb and keep the silicon.

Mr. Moore: What is the possibility of the iron taking up some silicon in the cupola?

Mr. Hollis: I cannot conceive of such a case. I can conceive of the cupola running hot enough to develop the silicon. The hotter the furnace, the higher the silicon.

Mr. Sargent: I would suggest that it would be a good plan for the members who are getting analyses to make an attempt to determine the loss of silicon. It is the one basis on which proper results can be obtained.

A resolution by Mr. Sercomb, that the association tender a vote of thanks to Mr. Wheeler for his excellent paper, was adopted, and the meeting adjourned until the third Wednesday in January.

MANUFACTURING MACHINE TOOLS.

Last summer one of our principal machine tool makers indulged in a protest against "special machines" that disturbed his "manufacture," and this brings to mind the fact that such business has become, in this country more than anywhere else, a "manufacture." It also raises the question if this is not a misfortune. The result is cheapness, and no more. It dispenses with skill, and whenever some special kind of machinery is wanted, as in the case of the water wheels at Niagara, we go abroad for it. There is continual importation of special machine tools going on.

We have a good many such here in San Francisco, and when special machines are wanted, the prices quoted in these "manufactories" are so high as to send the order abroad. We have seen quotations of prices as two to one for certain machine tools and even a greater difference.

There are factories of machine tools abroad, in England and Germany, for example, where merchant work is made for export, but machine shops there are not supplied with such tools. Some of the best makers in England, Messrs. Craven Brothers, of Manchester, for an example, never had an engraving of their tools, and, as we believe, no trade circulars. They photograph machines when completed, and send prints to accompany tenders, but there is no regular manufacture of tools, or such uniformity as will permit engravings to be used.

The system in vogue in England, and, as we believe, in Europe generally, can be best illustrated by a typical case, that occurred about twelve years ago. The writer, who was supplying certain machine tools for wood and iron, made in this country, was requested to call on a prominent locomotive superintendent, to receive instructions for a tender. "I want," said he, "a machine to bore holes in wood, and I observe that when there are to be holes of several sizes in one piece the augurs must be changed and the work rehandled. I want a spindle for each augur, so that all the holes can be bored at one handling." To have presented this officer with a trade catalogue of wood boring machines then in use would have availed nothing, except perhaps a courteous dismissal. We saw at once the advantage of what he proposed, and knew also that no such machines were made at the time. Careful drawings were made for a multiple spindle machine and sent in with a specification. The result was a second invitation to call on the officer, when his remarks were in substance as follows: "Your proposed machine seems well arranged, as far as it goes, but its functions are confined to revolving the augurs and moving them up and down. One man, or even a boy, can attend to this, but it requires a number of men to handle and present the timber so that the augurs can be set in position. Now is it not easier to move the augurs laterally across the timber, and can you not assist by power the movement of the timber endwise."

We had been designing one kind or another of wood boring machines for twenty years, and stood there before this officer, conscious of not knowing even the rudiments of what he wanted and required, but saw at once that he was correct, and a new machine was designed, with four spindles, all to traverse across the timber, and a self acting "roller bed" that would move the timber endwise.

The drawing was sent in with a specification, and in a short time came back the official order for the machine. It was constructed by Messrs. Bement & Son, now Bement & Miles, of Philadelphia, and cost about $800. This was the father, so to speak, of a numerous tribe that followed. Most of the leading makers in this country now make machines of the kind, which were, as above related, originally designed by Mr. Adams, of the London & Southwestern Railway, who furnished all the

"ideas" of the modern multiple spindle wood boring machine, now common in all countries.

We could illustrate the advantages of special practice by a number of instances of the same kind, where important improvements came about by a disregard of standard machines and machine "manufacture." It may cheapen machines, but does not improve them, in fact becomes a barrier to improvement, so there are at least two sides to the argument. It may be more comfortable and profitable to "manufacture" machine tools if people can be found to buy them, but it is not a very advanced method, or practicable with the highest class of customers who buy them. One firm we know of engrave their machines in true elevation, to a scale of 1-24, and have done so for twenty-five years past. This is a kind of compromise between the common trade circular plan and drawings, and has done very well, but calls for high skill in engraving to prevent a "flat" appearance. It is the old art of shading with India ink, now quite forgotten, and replaced by photography.—[Industry.

New Fields for Compressed Air.

In "The Widening Use of Compressed Air," a paper in the November *Engineering Magazine*, Whitfield Price Pressinger discusses the various new and old applications of this power and in conclusion refers to the prophecies recently made of its extended usefulness:

"In fact, there seems to be no limit to its employment and inventions in the success of which it is an important factor, and new methods of performing old tasks which it renders possible, are continually being introduced. And with the recent improvements in the direction of increasing the economy and efficiency of the prominent types of air-compressing machinery, and the further advantages realized from developing increased power by re-heating the air, many foresee the era when a central plant will be established and a compressed-air main will be situated under every street, operating mills and factories as in Paris and Birmingham; ventilating buildings in summer and warming them in winter; preserving perishable merchandise in cold storage; operating elevators, grinders, pumps, saws, printing-presses, lathes and the countless other machinery of commerce. Others even go further and look for its introduction into houses, the same as gas and water, for ventilating, for warming in winter and cooling in summer, and for operating lifts, sewing and washing-machines, and even clocks. In compressed-air we have a power ever ready to do our bidding, summoned or dismissed by the simple turning of a valve. It operates in place of steam without the least change of plant, obviating the employment of engineers and firemen, doing away with boilers and their accompanying disadvantages of waste steam, smoke, ashes, dirt, dust, risk of explosion, disagreeable odors, the expense of cartage, increased rates of fire insurance, water tax, etc. The old maxim that 'importance oft attaches to trifles light as air' becomes doubly true when we consider that this atmosphere, always so necessary to human existence, is being concentrated and harnessed to the service of mankind in so many new and widely-different ways."

AT Muncie, Ind., the White River Iron & Steel Co. are operating with a partial force. The Indiana Iron Co. are running in their finishing department. A correspondent says: "A few furnaces are running in the muck mill on scrap and swarth, but no puddling at all. The nail works run a little to work up castings, a lot of old nail machines and other stuff from their late fire, also a little pig iron. They have changed some double furnaces and are working ten single turn in place of 38 double turn."

A TELEGRAM from Braddock says: "All departments of the Edgar Thomson Steel Works, exclusive of the eight blast furnaces, are closed down for the annual holiday vacation. The mills will start up again the day after New Year's. The resumption will be on rails and it is authoritatively stated that there will be no breaks thereafter; that the condition of things in the affairs of the Carnegie Steel Co. will warrant the steady operation of these works."

Special Rates to California

Via popular Nickel Plate Road, account Mid-Winter Fair.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

Elwood, Ind., has located a foundry and machine shop. Particulars may be obtained from the Elwood Land Co.

The Hassell-Talcott Foundry & Iron Co., capitalized at $25,000, filed a certificate of fully paid up stock at Denver, Col., last week.

The Ohio Wringer & Lawn Mower Co., of Springfield, O., will be in the market for a blower, three drilling machines, one double spindle emery wheel and one tool grinder, an engine lathe for special work, a planer and a punching and shearing press.

The Supervising Architect, Washington, D. C., will receive sealed proposals until 2 P. M., Jan. 16, 1894, for all the labor and materials required for the floor, ceiling and roof construction and roof covering for the superstructure of the U. S. Postoffice building at Chester, Pa.

The Oster Mfg. Co., Cleveland, capital $100,000 has been incorporated by Frank Rockefeller, F. B. Squire, D. H. Kimberly, P. Ahlefeld and Herman W. Oster, to manufacture bolt cutters, machinists' tools, etc. H. W. Oster has been the foreman of the Hart Mfg. Co. of Cleveland.

At Elwood, Ind., another tin plate enterprise is on foot. Col. T. L. Morris, Chicago; Edwin Stevens, Cincinnati, and E. Levy, of Elwood, are the promotors. Their plans take in a tin plate factory with 2,500 boxes weekly capacity and a rolling mill. Work on the building will begin at once.

Sealed proposals will be received at the Supervising Architect's office, Washington, D. C. until 2 P. M., Jan. 12, 1894, for all the labor and materials required for the iron and wood floor, ceiling and roof construction, roof covering, etc., for the superstructure of the U. S. Postoffice building at Columbus, Ga.

New Construction:—

The buildings for the new shops at Lenoir City, Tenn., are going up rapidly. The Lenoir Car Co.'s main building, 100 x 425 feet, will probably be finished in about four weeks.

The Phœnix Horseshoe Co. of Poughkeepsie, N. Y., have just completed a new plant at Joliet, Ill. The main structure is 156 x 76 feet, with a lean-to 76 x 40 feet, the bar mill is 144 x 121 feet. Another department for the heating of billets and the forming of shoes is 200 x 70 feet.

The contract for supplying the structural steel to be used in the construction of the immense new plant of the Westinghouse Electric M'f'g. Co. at Wilmerding, Pa. was awarded to the Carnegie Steel Co. The buildings are to be constructed entirely of brick and steel and the contract is a very large one. There were several bidders and the competition was extremely lively. The Carnegie Steel Co.'s figures were considerably under those of the other firms.

Fires and Accidents:—

Fire partly destroyed the Lakeside Iron Works at Muskegon, Mich., Dec. 16. Loss $4,000.

The main shaft in the Cleveland Rolling Mill Co.'s wire mill broke last week. Several hundred men were idle pending repairs.

The New Castle, Pa., street car works were destroyed by fire. The loss is $8,000; insurance about two-thirds. They will be rebuilt at once.

General Industrial Notes:—

The Atlantic Iron Works, at New Castle, Pa., have resumed.

At Buffalo, the American Radiator works, which employed 300 men, have shut down.

Between 500 and 600 men are now at work in the Middletown, Pa., tube works' furnaces.

Wm. Tod & Co., of Youngstown, are running eight hours a day. The men have been reduced 10 per cent.

There is talk at Anderson, Ind., of consolidating the Anderson Steel Casting Co. and the Irondale Iron & Steel Co.

Workmen are repairing furnace No. 2, of the Carrie Furnace Co., at Keating Station, Pa., and it is reported that the furnace

Bucyrus Steam Shovel & Dredge Co.,

—MAKERS OF—

STEAM SHOVELS — In Five Sizes for Railroad and Contract Work, Brick Yards, Stone Quarries, Stripping and Handling Iron Ore, Coal, Etc.

STEAM DREDGES — Of All Types and Sizes; for All Purposes; Elevator, Dipper, Clam Shell, Suction. Special Machines for Special Work.

WRECKING CARS — BOTH HAND AND STEAM. CAPACITIES 10 TO 35 TONS.

PILE DRIVERS — WITH EITHER DROP OR STEAM HAMMERS.

SOUTH MILWAUKEE, WIS., or BUCYRUS, OHIO.

The "Little Giant" Excavator.

WEIGHT 20 TONS.
CAPACITY 1,500 CUBIC YARDS PER DAY.

The only Traction Shovel on the market, and nothing approaches it for general purposes.

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MANUFACTURERS OF
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Write for Photographs and Descriptive Matter.
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FIRE BRICK, FIRE CLAY,
For Blast Furnaces, Cupola Lining, Boiler Setting, Smoke Stack Lining, or Any Other Purpose.
EVERY CLASS OF SPECIAL SHAPES AND SIZES.

ALL KINDS OF
Foundry Supplies.
FACINGS, BLACKINGS AND MOULDING SANDS
Of All Kinds.

will be blown in shortly. It has been out of blast almost a year.

The bolt and nut works of J. H. Sternberg & Son of Reading, Pa., have resumed operations; 400 men are employed.

The Baldwin Locomotive Works, at Philadelphia, have received additional orders. The force will be increased after Jan. 1.

Work in the Chicago & Alton machine shops at Bloomington, Ill., has resumed with a full force. Two thousand men will be employed.

A crank shaft weighing 28 tons, for the Pacific Mail Steamship Company, was shipped last week to San Francisco from the Bethlehem Iron Works.

The Niles Tool Works Co., Hamilton, O., have posted notices calling the old night gang back to work. They will work 10 hours instead of eight hereafter.

The Pen Argyle, Pa., Iron Works, which have recently been working nine hours a day, with short orders, have begun running full time. The plant employs 60 men.

The Spang Steel & Iron Works at Sharpsburg, Pa., will run full for five days this week, converting the material on hand into stock, after which the works will shut down indefinitely.

The Reading foundry, at Reading, Pa., has closed down on account of a lack of orders. About 150 men are thrown out of work. The foundry will resume as soon as orders are received.

The Iron Car Co., which supplants the Iron Car Equipment Co., announces that the works in Huntingdon, Pa., will resume at an early date, giving employment to several hundred men.

The Haselton Furnace of the Andrews Bros. Co., of Youngstown, O. is doing better work than ever before. It is making an average of 175 tons daily, principally Nos. 1 and 2 foundry.

The Ames Iron Works, Oswego, N. Y., manufacturing boilers, etc., and employing 400 men, have shut down for this week. Wages will be reduced 10 per cent. on resumption of business.

About Sept. 1 the Griffin Car Wheel Co., of Detroit, made a reduction in wages of 10 per cent. Their employes have now received notice that the wages will be put back to the old figure, the advance dating from Dec. 1.

The contract was let last week to the Addyston Pipe & Steel Co., of Cincinnati, to furnish the city of Milwaukee with 3,000 tons of water pipe at $19.85 a ton. This is the cheapest rate at which the city ever purchased water pipe.

The Radford Pipe & Foundry Co., whose works are at Radford, Va., have been running steadily for several months past, and are now pushing production to their utmost capacity. They have taken several good sized contracts of late.

The plant of Summers Bros. & Co., Struthers O. manufacturers of box annealed sheet iron and sheet steel, is in partial operation on light steel sheets. Prospects for continued operation through the winter months are reported bright.

The outlook for mill employes at Steelton is not bright. Only the frog shop and the bridge and construction departments of the great steel plant are in operation, and with no promise of further work until February there will be need in many homes.

At Johnstown, Pa., the Cambria Iron Co. is now employing 5,000 men, and the Johnson works 1,200. Assistant General Manager Weaver, of the Cambria company, says that less than 1,000 men dependent on the Cambria company for employment are idle.

The Marinette (Wis.) Iron Works Co., by a unanimous vote of stockholders, has gone into voluntary dissolution, affecting both works at Marinette and West Duluth. The business will go on as before. The directors will act as trustees and legal administrators.

The Homestead steel plant was closed down Saturday in all departments, to remain closed until Jan. 2. The management say the shutdown will not last longer. The 119-inch and 40-inch mills closed earlier in the week. It is stated that since the

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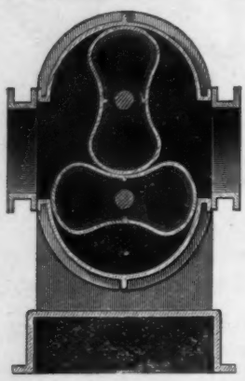

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depression in the steel trade began the plant has made more than half time.

It is reported that the big works of the General Electric Co., at Schenectady, N. Y., will start up on full time on Jan. 1. A rumor also prevails that the company will abandon its works at Lynn, Mass., and Orange, N. J., and concentrate all its plant at Schenectady.

The Valley Steel Co. filed articles of incorporation at St. Louis, last week. Its capital stock is $450,000, of which $250,000 preferred is all paid, and $200,000 common stock 92 per cent. paid. Of the preferred stock, Theo. A. Meysenburg owns 1,400 shares, Chas. A. McNair 500, and Oliver L. Garrison, 250. Of the common stock Fielding W. Oliver owns 1,000 shares Benj. S. Adams 500, and Theo. A. Meysenburg 500.

Wheeling district: About two-thirds of the Ætna-Standard plant is going this week.. . The skelp mill, the last department of the Wheeling Steel & Iron Co., in operation, shut down about ten days ago and will not resume until after the first of January. . . This is the dull season in the corrugating business and trade this year at the Wheeling Corrugating Works now is fifty per cent. duller than it was at this time one year ago. . . Three furnaces, one lap weld, one butt weld and one bell weld are going in the tube works at the Riverside. Two plate mills, B and C, are going in the plate mill department. The blast furnace is going and the steel plant is idle.—[Ohio Valley Manufacturer.

Robert Kelley, controller of the West Superior Iron & Steel Co., who has recently returned to Superior, Wis., from the East, says that no proposition has been submitted from the Superior Land & Improvement Co., or the bondholders of the steel plant, for the acquisition and opening of the works. The sale of the plant looked for on Jan. 2 would not take place, he said. The wire nail factory project, he added, is off for the present, or until the steel plant is under operation. "The fact of the matter is," he said, "the Rockefellers have not been anxious to take up the steel plant matter, which involved a big expenditure of money, at a time when steel making was unprofitable, and because they have many other important matters on hand. The slowness with which money was paid out by them last summer on the Mesabi deal is an indication that they had all the could attend to. The $10,000,000 mortgage just filed was necessary, I believe, to help the big undertaking along."

Houston, Stanwood & Gamble, of Cincinnati, have sold engines to the following firms since Sept. 1: Forbes, Liddell & Co., Montgomery, Ala.; Stedman Foundry & Machine Co., Aurora, Ind.; Trenton Electric Light Co., Trenton, Tenn.; Hickman Lumber & Mfg. Co., Hickman, Ky.; Wendell Ruof, Knoxville, Tenn.; Olney Creamery Co., Olney, O.; N. West & Co., Pittsburg, Pa.; Laidlaw-Dunn-Gordon Co., Cincinnati, O.; N. Christianson, Erin, Tenn.; Anderson & Tulley, Memphis, Tenn.; H. M. Sciple & Co., Philadelphia, Pa.; Thomas Maddock & Sons, Trenton, N. J.; Ward, Kent & Co., Greenfield, Tenn; H. Holtzman & Son, Columbus, O.; Royersford Machine Co., Birdsboro, Pa.; Ford & Donnelly, Kokomo, Ind.; Cincinnati Club House, Cincinnati, O.; H. M. Sciple & Co., for Coaling Sta., at Tampica, Mex.; Randle Machine Co., Cincinnati, O.; Jackson Ginery Co., Jackson, Miss.; J. R. Beaty & Co., Quinnimont, W. Va.; J. H. Fall & Co., Nashville, Tenn.; Peoria Cordage Co., Peoria, Ill.; Warden, Bushnell & Glessner, Springfield, O.; Hyeronymus Bros., Mobile, Ala.; Cincinnati Southern R. R. (Ludlow shops), Ludlow, Ky.; Isaac Paul, None Such, Ky.; Georgia Iron Works, Augusta, Ga.

Holiday Excursions

On the Nickel Plate Road, Dec. 23, 24, 25, 30, 31, and Jan. 1.

Holiday Excursions via Pennsylvania Lines.

On December 23, 24, 25, 30 and 31, 1893, and January 1, 1894, excursion tickets at low round trip rates will be sold from stations on the Pennsylvania Lines west of Pittsburg, to points on those lines in Western Pennsylvania, Ohio, Indiana, Illinois, Kentucky, and West Virginia. Return coupon will be valid until January 2. For details, please apply to nearest Pennsylvania Line ticket agent.

See Nickel Plate Agents

Regarding Holiday Excursions. Tickets will be sold at reduced rates between all stations on the Nickel Plate Road; also to points on many connecting lines.

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Holiday Excursion.

Valley Railway will sell excursion tickets at reduced rates, between all stations, Dec. 23, 24, 25, 30 and 31, 1893, and Jan. 1, 1894; good returning to Jan. 2, 1894, inclusive. The rate between Cleveland and Canton will be $1.75 for the round trip.

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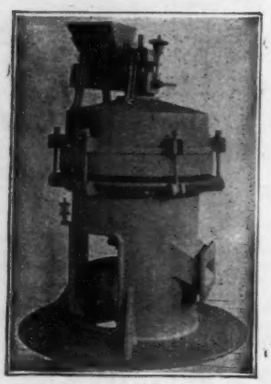

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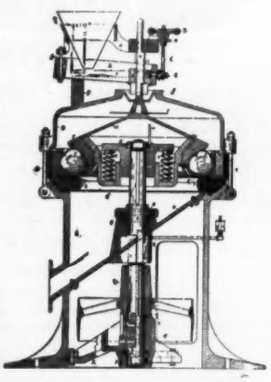

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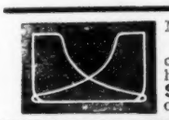

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Ravenna and Alliance	† 3.25 pm	† 9.50 am
Hudson and Ravenna	* 5 .0 pm	* 8.25 am
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Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Garrett	†3:00 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†3:00 P M	†11:00 A M
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The Whitman & Barnes Mfg. Co., Akron, O.

Drop Presses—
Toledo Tool & Machine Co., Toledo, O.
Cleveland Stamping & Tool Co., Cleveland, O.

Ejectors—
James Jenks, Detroit, Mich.
American Injector Co.
Penberthy Injector Co., Detroit, Mich.

Elevators—
The James L. Haven Co., Cincinnati, O.
Lane & Bodley Co., Cincinnati, O.

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago, Ill.

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Acme Safety Emery Wheel Co., Detroit, Mich.
H. N. Green, 254 Fulton st., Brooklyn, N. Y.

Eave Troughs and Conductors—
Berger Mfg. Co., Canton, O.

Engravers and Electrotypers—
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Union Electrotype Foundry, Cleveland.

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Penberthy Injector Co., Detroit, Mich.
Eagle Lubricator Co., Cleveland, O.
James Jenks, Detroit, Mich.

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Van Dusen Gas Engine Co., Cincinnati, O.
Weber Gas & Gasoline Engine Co., Kansas City, Mo.

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Wm. Tod & Co., Youngstown, O
E. H. Jones & Co., Cleveland.
Skinner Engine Co., Erie, Pa.
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L. Spence & Son, Martins Ferry, O.
Weston Engine Co., Painted Post, N. Y.
Brightman Stoker Co., Cleveland, O.
Wells Engine Co., New York City.
The Brownell & Co., Dayton, O.
Richard O. Jones, Cuyahoga bldg., Cleveland, O.

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Brightman Stoker Co., Cleveland, O.
Richard A. Parker, Marquette, Mich.
Artificial Gas Engineering Co., Pittsburg, Pa.
Richard O. Jones, Cuyahoga bldg., Cleveland, O.

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W. C. Lyman, Chicago, Ill.

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Hercules Powder Co., Cleveland.

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B. F. Sturtevant Co., Boston, Mass.
Connersville Blower Co, Connersville, Ind.

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E. K. Morris & Co., Cincinnati, O.
Arcade File Works, Anderson, Ind.

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J. Downerd & Son Co., Zanesville, O.
J. V. Rose, Sharon, Pa.
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Garden City Sand Co., Chicago, Ill.
The J. S. McCormick Co., Pittsburg, Pa.
Geo. H. Anderson & Co., Pittsburg, Pa.

Fire Equipment—
Buffalo Fire Equipment Co., Buffalo, N. Y.

Foot and Power Lathes—
Prentiss Tool & Supply Co., Chicago, Ill.
W. F. & John Barnes Co., Rockford, Ill.
W. H. Robertson, Chicago, Ill.
Hill, Clarke & Co., Chicago, Ill.

Foundries—
Harn, Ow & Co., Beaver Falls, Pa.
Addyston Pipe & Steel Co., Cincinnati, O.
Radford Pipe & Foundry Co., Cincinnati, O.
Lane & Bodley Co., Cincinnati, O.
The Sam'l C. Tatum Co., Cincinnati, O.
Brightman Stoker Co., Cleveland, O.
The Lloyd-Booth Co., Youngstown, O.
Taylor & Boggis Foundry Co., Cleveland, O.
John T. Caulfield, Richmond, Ind.
Lake Shore Iron Works, Marquette, Mich.
Wm. Tod & Co., Youngstown, O.

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Garden City Sand Co., Chicago, Ill.
Detroit Foundry Equipment Co., Detroit, Mich.
The J. S. McCormick Co., Pittsburg, Pa.
Greiner Economical Cupola Co., Chicago, Ill.

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Gordon Hollow Blast Grate Co., Greenville, Mich.

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Union Mining Co., Mt. Savage, Md.

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Vulcan Iron Works Co., Toledo, O.

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Corrigan, Ives & Co., Cleveland.
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Hill, Clarke & Co., Chicago, Ill.

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Vulcan Iron Works Co., Toledo, O.
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W. H. Robertson, Chicago, Ill.
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adial Drills—
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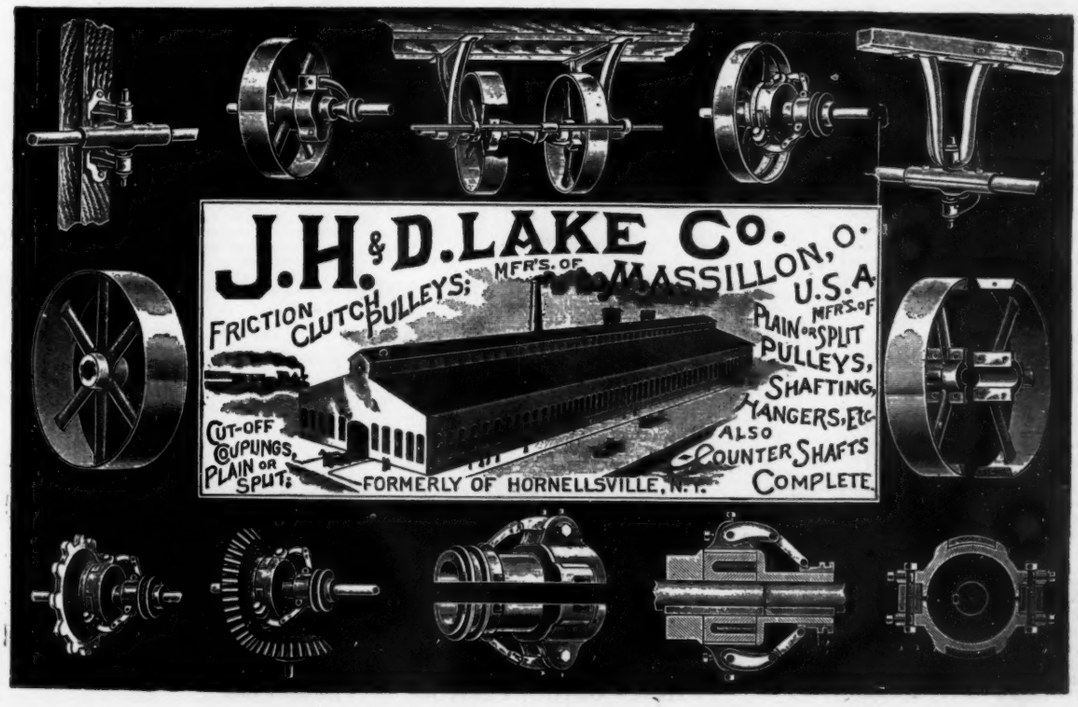
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PROPOSALS FOR MACHINERY AND TOOLS.

BOARD OF EDUCATION, OFFICE OF THE SCHOOL DIRECTOR, 190 EUCLID AVENUE. CLEVELAND, O., December 8, 1893.

SEALED PROPOSALS will be received at the office of the clerk of the Board of Education, 190 Euclid avenue, Cleveland, O. until 12 o'clock noon, January 5, 1894, for furnishing the lathes, drills, planes, milling machines, vices, hammers, squares, scales, dividers, calipers, files, and such other machinery and tools as are needed to equip the Central Manual Training School, according to the specifications therefor on file in the office of the School Director.

All proposals must be sealed up, addressed to the clerk, and plainly endorsed on the outside, "Proposals for machinery and tools."

Proposals are to be for machinery and tools delivered complete in the Central Manual Training School building.

Specifications may be procured at this office on application, and all proposals must be made on blanks furnished by the School Director, and must be accompanied by a bond of five hundred ($500) dollars, with good and sufficient surety, resident of Cleveland, that if the bids are accepted the machinery and tools will be delivered as proposed.

Each bid must contain the name of every person interested in the same.

All proposals not in accordance with specifications furnished by the School Director will be rejected.

The School Director reserves the right to reject any or all or part of any or all proposals.

H. Q. SARGENT, School Director.

"5,000 AMERICAN FOUNDRIES."

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27 Vincent St., Cleveland, O.

Price Postpaid $5.00.

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IRON ORE.

[On Lake Erie docks.]

Low Phosphorus Bessemer	$4.15@$0.00
No. 1 Specular, Bessemer	4.00@ 0.00
No. 1 Bessemer hematite	3.50@ 3.75
Hematites No. 1 non-Bessemer	2.75@ 3.25
No 1. Specular, non-Bessemer	3.00@ 3.50

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$11 00@$11 25
No. 1 Strong Foundry	12 00@ 13 00
No. 2 Strong Foundry	11 00@ 12 00
No. 1 Grey Forge, red short	10 50@ 00 00
No. 2 Gray Forge, neutral	10 00@ 10 25
No. 1 American Scotch	13 00@ 00 00
No. 2 American Scotch	12 50@ 00 00
Lake Superior Charcoal	15 00@ 00 00

PITTSBURG:

No. 1 Foundry	$12 00@$12 25
No. 2 Foundry	11 00@ 11 25
Grey Forge	10 25@ 10 50
White and Mottled	10 00@ 00 00
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	11 00@ 11 25

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$15 50@$16 00
Local Coke Foundry No. 1	13 50@ 14 00
Local Coke Foundry No. 2	12 25@ 12 75
Local Coke Foundry No. 3	12 00@ 12 50
Local Scotch Foundry No. 1	14 00@ 14 50
Local Scotch Foundry No. 2	13 50@ 14 00
Local Scotch Foundry No. 3	13 00@ 13 50
Southern Coke No. 1	13 75@ 14 00
Southern Coke No. 2	12 10@ 12 35
Southern Coke No. 3	11 60@ 11 85
Southern No. 1 Soft	12 10@ 12 35
Southern No. 2 Soft	11 60@ 11 85
Southern Silveries No. 1	14 00
Southern Silveries No. 2	13 50
Southern Gray Forge	10 75@ 11 00
Ohio Silveries No. 1	16 50@ 17 00
Ohio Silveries No. 2	16 25@ 16 75
Ohio Strong Softeners	15 50@ 16 00
Alabama Car Wheel	18 25@ 18 75

CINCINNATI (reported by Rogers, Brown & Co.):

Southern Coke No. 1, Foundry	$12 00@$12 25
Southern Coke No. 2 and No. 1 Soft	11 00@ 11 25
Hanging Rock Coke, No 1	13 75@ 14 25
Hanging Rock Charcoal No. 1, Fdy	18 50@ 19 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	15 50@ 16 00
Southern Coke, Grey Forge	10 00@ 10 25
" " Mottled	9 75@ 10 00
Standard Alabama Car Wheel	17 50@ 18 00
Tennessee " "	16 00@ 16 50
Lake Superior " "	17 00@ 17 50

BUFFALO (reported by Rogers, Brown & Co.)

Mahoning and Shenango Valley, strong, No. 1 Foundry	$13 25
Mahoning and Shenango Valley, strong, No. 2 Foundry	12 75
Ohio Softener No. 1	13 25
Ohio Softener No. 2	12 75
Jackson Co. Silvery, No. 1	$16 80@ 17 30
Jackson Co. Silvery No. 2	15 00@ 16 00
Lake Superior Charcoal	15 75
Tennessee Charcoal	16 75
Southern Softener No. 1	12 25
Alabama Car Wheel	$18 50@ 19 50
Hanging Rock Charcoal	$18 50@ 20 00

DETROIT (reported by F. B. Stevens, 74 Griswold St.):

Southern Coke No. 1 Foundry	$13 85@$14 10
Southern Coke No. 2 Foundry	12 10@ 12 35
Southern Coke No. 3 Foundry	11 60@ 11 35
Southern Coke No. 1 Foundry soft	12 10@ 12 35
Southern Coke No. 2 Foundry soft	11 85@ 12 10
Tennessee Charcoal No. 1 Foundry	15 10@ 15 35
Tennessee Charcoal No. 2 Foundry	14 10@ 14 35
Tennessee Charcoal No. 3 Foundry	13 60@ 13 85
Lake Superior Charcoal No. 1	15 50@ 16 00

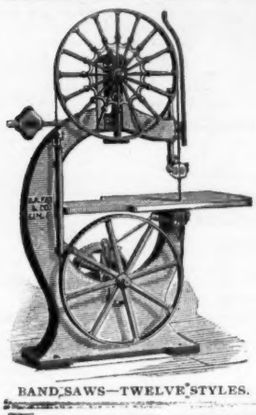
ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$12 75@$13 00
Southern Coke No. 2	11 50@ 11 75
Southern Coke No. 3	11 00@ 11 25
Southern Grey Forge	10 50@ 10 75
Southern Charcoal No. 1	15 50@ 16 00
Missouri Charcoal No. 1	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	17 50@ 18 00
Southern	17 50@ 18 00
Connellsville Coke, St. Louis	4 80

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	Gross Tons
Old iron rails	$14 00
Old steel rails	12 50
	Net Tons
No. 1 R. R. wrought scrap	$10 00
No. 1 wrought scrap	9 50
No. 1 Machine cast scrap	9 75
Iron axles	16 00
Axle turnings	10 00
Wrought turnings (free from cast)	8 00
Cast borings	6 00
Uncut wrought iron boilers	5 50
Steel boiler Plates	9 50
Grate bars	5 00
Pipes and flues (clean)	8 50
Tank iron	8 00
Hoop and band iron	6 00
Sheet iron	6 00
Wrought drillings	7 00
Malleable iron	8 50



BAND SAWS—TWELVE STYLES.

J. A. FAY & EGAN CO.,

251 to 271 W. Front St., CINCINNATI, OHIO.

OWNERS AND OPERATORS OF

J. A. FAY & CO. THE EGAN CO.

1835 ESTABLISHED 1873

Originators and Constructors of

WOOD-WORKING MACHINERY.

MEDALS FOR SUPERIORITY OVER ALL COMPETITORS.

350 awarded us by the various expositions in this country and abroad.

"GRAND PRIX" by the Universal Exposition, Paris, 1889.

Decoration of the "Legion of Honor" conferred by the French Government.

HAND PLANERS—20 SIZES AND KINDS.

PERFORATED METALS

OF ALL KINDS FOR

MILLING MINING AND AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.

LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

THE ROBERT AITCHISON. PERFORATED METAL CO.,

OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

BEING IN THE BOILER BUSINESS,

MAKING STATIONARY TUBULAR BOILERS EXCLUSIVELY.

WE CAN MAKE A BETTER BOILER AND ALTHOUGH WE MAKE THEM OF FLANGE STEEL WITH WELDLESS BRACES AND ECLIPSE MANHOLES SELL THEM FOR LESS MONEY THAN OLD STYLE ONES.

WE FURNISH NEATER LITHOGRAPHS AND DETAIL ILLUSTRATIONS OF THIS CLASS OF BOILER THAN ANY FIRM IN THE UNITED STATES

FULTON STEAM BOILER WORKS AND FOUNDRY, RICHMOND, IND.

THE STURTEVANT IMPROVED PORTABLE FORGES.

PRESSURE BLOWERS

For Cupola Furnaces and Forges.

The Sturtevant System of Heating and Ventilating Manufacturing Establishments.

B. F. STURTEVANT CO.,

BOSTON, MASS.

(2)

91 Liberty St., NEW YORK. 16 So. Canal St., CHICAGO. 135 No. Third St., PHILADELPHIA.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.45C@1.60C
Angles	1.45C@1.50C
Tees	1.70C@1.75C
Universal Plates	1.50C
Sheared Plates	1.60C

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
4¼ to 6 by ⅜ to 1 inch	1 65
1¾ to 6 by 1⅛ to 2 inch	1 80
1¼ & 1⅜ by ⅜ to ¾ inch	1 65
1 & 1⅛ by ⅜ to ¾ inch	1 70
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 80

Round and Square.

1 to 1⅞ inch	1 60
2 to 2⅝ inch	1 70
2¾ to 3¼ inch	1 85
3⅜ to 4 inch	2 10
4¼ to 4½ inch	2 79
4¾ to 5 inch	2

Oval.

⅜ to 1¼ inch	1 80
⅝ to ¾ inch	1 80
½	2 00
⅜	2 20

Half Oval and Half Round.

1¼ to 3 inch	2 15
⅜ to 1⅛ inch	1 95
⅝ to ¾ inch	2 20
½	2 35
⅜	3 45

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 70
1 to 1⅜ by ¼ and 5-16 inch	1 75
¾ to ⅞ by ¼ and 5-16 inch	1 85
½ to ⅝ by ¼ and 5-16 inch	2 10

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7 16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2
1 7-16 to 2, No. 22	2 50
1⅛ to 1⅜, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to1⅜, No. 21	2 40
1⅛ to 1⅜, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 25
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16 No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅝, No. 13, 14 and 15	2 90
⅝, No. 16, 17 and 18	3 00
⅝, No. 19 and 20	3 10
⅝, No. 21	3 20
⅝, No. 22	3 30
⅝, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16 No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
7/16, No. 13, 14 and 15	3 80
7/16, No. 16, 17 and 18	3 90
7/16, No. 19 and 20	4 00
7/16, No. 21	4 30
7/16, No. 22	4 40
7/16, No. 23	4 55

Light Band.

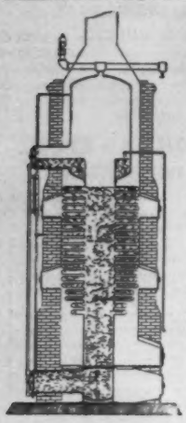
1¼ to 6 by ⅛ to 3-16 inch	1 90
1½ to 6 by Nos. 11 and 12	1 95
1 to 1⅜ by ⅛ to 3-16 inch	1 95
1 to 1⅜ by Nos. 11 and 12	2 00
⅞ and 13-16 by ⅛ to 3-16 inch	2 10
⅞ and 13-16 by Nos. 11 and 12	2 15
¾ and 11-16 by ⅛ to 3-16 inch	2 20
¾ and 11-16 by Nos. 11 and 12	2 25
⅝ and 9-16 by ⅛ to 3-16 inch	2 35
⅝ and 9-16 by Nos. 11 and 12	2 40
½ by ⅜ to 3-16 inch	2 50
¼ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 10
⅞ inch, " " " " 13 and 14	2 20
¾ inch, " " " " 11 and 12	2 25
¾ inch, " " " " 13 and 14	2 45

Sheet Iron.

No. 10	2 15
No. 12	2 20
No. 14	2 25



THE ADAMS
WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co., }
NILES, O., Aug. 18, 1893. }

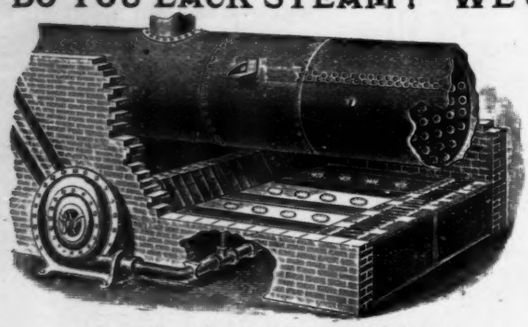
Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.
807 The Cuyahoga, - CLEVELAND. O.

DO YOU LACK STEAM? WE CAN HELP YOU!



Gordon Hollow Blast Grate for Culm, Slack, Etc.

Sold only upon approval after trial.

For information, prices, or estimates,

ADDRESS

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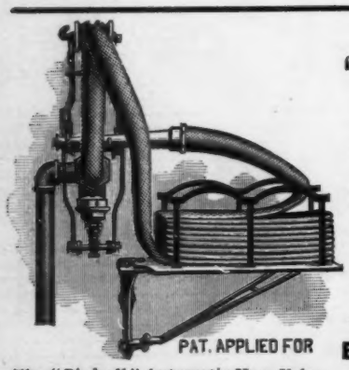
Hollow Blast Grate Co.,
GREENVILLE, MICH.

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**



PAT. APPLIED FOR

The "Birdsall" Automatic Hose Valve.

WE CLAIM FOR THE

"BIRDSALL" AUTOMATIC HOSE VALVE

1st. That it is instantaneous in its action.
2d. As soon as hose is laid out the valve is fully open without any other manipulation.
3d. Time wasted in making connections and opening valves by hand is avoided.
4th. Always ready, impossible to use it wrong, and is therefore operative by any person.
5th It is durable, ornamental, and reasonable in cost.
6th. It is adapted to any place where hose is used.

Agents wanted. For further information address

BUFFALO FIRE EQUIPMENT CO.,
BUFFALO, N. Y. E. M. Birdsall, M'g'r.

HERCULES POWDER

HERCULES,
THE GREAT STUMP AND ROCK
ANNIHILATOR.

SEND FOR DESCRIPTIVE PAMPHLET.

Stump before a blast. | Fragments after a blast.

STRONGEST and SAFEST EXPLOSIVE
Known to the Arts.
POWDER, FUSE, CAPS,
Electric Mining Goods,
AND ALL TOOLS FOR STUMP BLASTING,
FOR SALE BY THE
HERCULES POWDER COMPANY,
40 Prospect Street, Cleveland, Ohio.
J. W. WILLARD, Manager.

No. 15-17	2 35
No. 18	2 50
No. 20	2 60
No. 22-24	2 70
No. 25 26	2 80
No 27	2 90

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 00
Shell	2 25
Flange	2 50
Marine Flange	2 75
Fire Box	3 75

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s.
1 to 2 in. inclusive	08
9-16 to ½ in.	08½
7-16 to ⅜ and 2⅜ to 3 in.	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4½	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
3-16 in	13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price, 2 10
Tire	" 2 25
Spring	" 2 50
Sleigh Shoe	" 2 50
Toe Calk	" 2 35
Cutter Shoes, tapered and bent	" 2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 80
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 50

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 30
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ 1b 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1⅛"	dis 50&10
Morse Taper and Straight Shank Larger than 1⅛"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

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(PRINCIPAL)
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New York Offices
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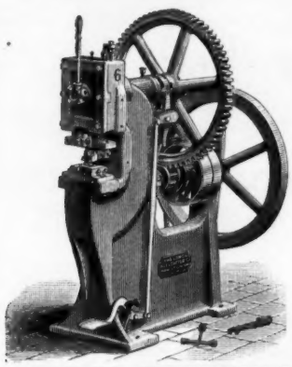
MINING, MINERAL AND TIMBER LANDS

Municipal Bonds, Large Tracts of Florida
Farm and City Mortgages, Phosphate and
Short Time Paper. Hammock Lands.

EXAMINATIONS AND REPORTS MADE. Correspondence Solicited.



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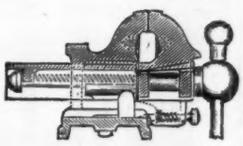
LONG & ALLSTATTER CO.
HAMILTON, OHIO, U. S. A.

Manufacturers of Belt, Steam and Electrically driven
POWER PUNCHES AND SHEARS,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc.
Send for Catalogue. (3)

VISE.

Patented Dec. 27, 1892.
IT HAS QUALITIES THAT ARE UNDISPUTED.
Rapid, Active, Prompt.
One movement in and out, one turn of the hand and the work is secured.



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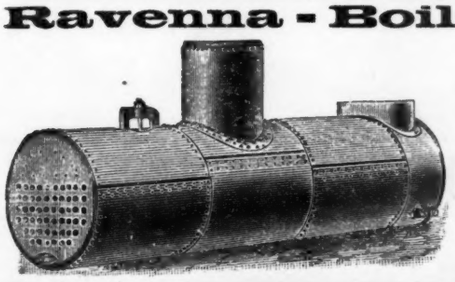
SKINNER ENGINE CO. ERIE, PA.
Center or Side CRANK Automatic or Throttling
ENGINES
FOR NEW FEATURES SEE NEW CATALOGUE.

Ravenna - Boiler - Works.



MANUFACTURERS OF ALL KINDS OF
Steam Boilers, TANKS,
Plate and Sheet Iron
Work of every description. Write for prices.
RAVENNA, - - OHIO.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 55@60
Norton's	dis 55@60
Grant	dis 55@60
Sterling	dis 60
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60
Vulcanite	dis 60&10
Hamden	dis 60&10
Cyclone	dis 60

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	15c
" " " " over 5 lbs	12c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3¾	3½
Hexagon	15½	11½	8½	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 75
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.55
{ Less than car lots	$1.65

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	₩ lb 9@10
Russia " "	₩ lb 14
Italian " "	₩ lb 13@19
Plumbago Piston	₩ lb 40
Peerless	₩ lb 60
Morrison's "	₩ lb 50
Square Flax "	₩ lb 50
Sheet Rubber	₩ lb 12&24
Excelsior Rubber	₩ lb 48
Rainbow { Full Rolls	45c ₩ lb
Rainbow { Less than Full Rolls	50c ₩ lb
Eclipse Gasket	₩ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 40
Medart Pulleys	dis 50
Split Wood Pulleys	dis 50@55

Rivets.

Iron, Thousand, list November 17	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

	New List, Jan. 18, 1884
Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

Bolt and Nut Works.

THE UPSON NUT CO., Manufacturers of Nuts, Washers, Carriage, Machine, Plow and Elevator Bolts, Coach Screws, etc.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stampes Seals, Stencils, Automatic Check Punchs, and Numbering Machines. 92 Seneca St.

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COMMISSION DEALER IN

Iron Ore, Pig Iron

AND METALS.

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ESTABLISHED 1854.

PETER GERLACH & CO.,

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Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus St.

Factories on Columbus, Winter and Leonard Sts

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CORRIGAN, IVES & CO.,

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Rooms 716, 717, 718, 719 Perry-Payne Bld'g,

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THE

CLEVELAND-CLIFFS IRON CO.,

Cleveland Iron Mining Co.—Iron Cliffs Co.

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Lake Superior Iron Ores and Pioneer Charcoal Pig Iron.

Mercantile Building, - CLEVELAND, O.

THE CONDIT-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, . OHIO.

Oglebay, Norton & Co..

Successors to Tuttle, Oglebay & Co.

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IRON ORES,

FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS.

CLEVELAND, OHIO.

J. H. OUTHWAITE. W. G. POLLOCK.

J. H. OUTHWAITE & CO.,

Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

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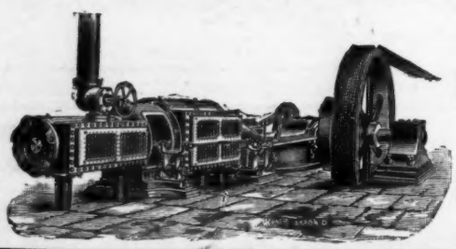

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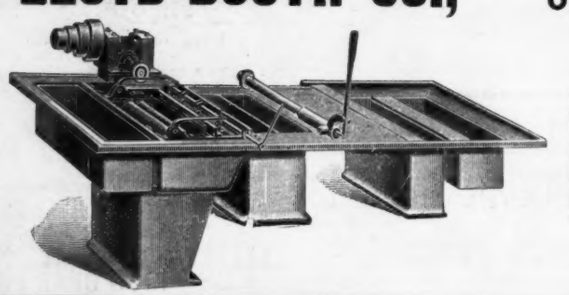

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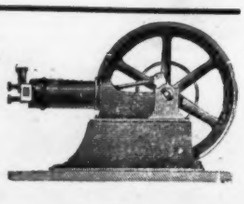

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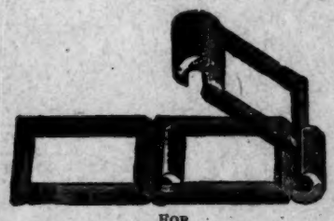

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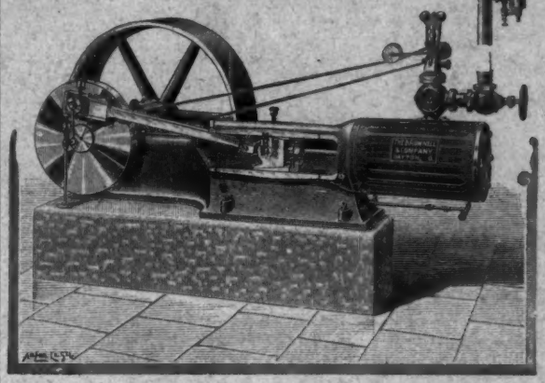

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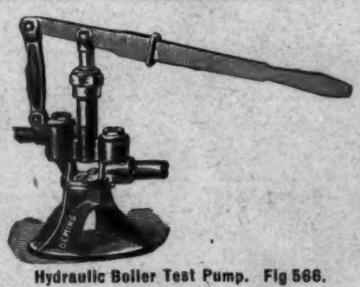

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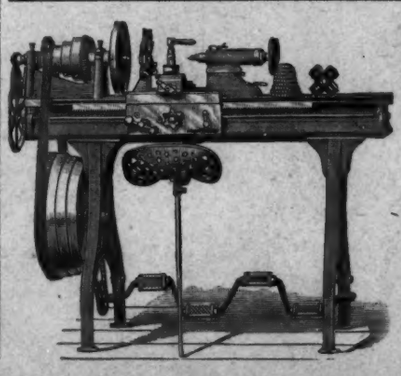

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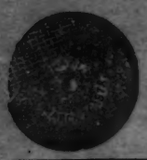

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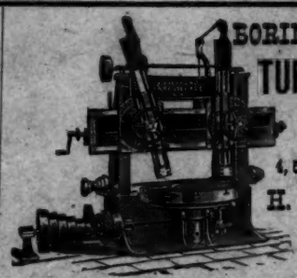

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